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General Jadwin.  
Captain Chambers.  
"or You."

# Successful Methods

Construction - Road Making - Engineering - Industrial - Mining

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Vol. 6. December 1924 No. 12

# Sterling

## This Little Cotter Pin Means a Lot



**I**N STERLING wheelbarrows, just as in everything else, it's the little things that count.

This cotter pin is a small detail. Its value in Sterling construction is great.

It is used at both ends of the axle, passing through the malleable brackets and axle, holding the latter securely in place. It is impossible for a Sterling axle to turn with the hub.

Contrast this with the ordinary bolt axle construction—no nuts to work loose and come off—no tightening up until the frame binds the hub. Just a nice fit—no more, no less.

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### *Eleven Other Sterling Features*

Malleable Wheel Guards  
Broad, Flat Leg Bearings  
Self-Lubricating Wheels  
Cold Rolled Steel Shafts  
Patented Handle Clamps  
Malleable Wheel Supports  
Clear Maple Handles  
Riveted Leg Braces  
Front "V" Brace  
Balanced Load  
Interchangeable Parts

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**STERLING WHEELBARROW COMPANY**  
**MILWAUKEE, WISCONSIN**

New York    Boston    Cleveland    Chicago    Detroit    St. Louis

# Successful Methods

## *A Magazine of Construction Service*

Published by SUCCESSFUL METHODS, Inc.

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Vol. 6

DECEMBER, 1924

No. 12

### Epochal Events

FOR the last three years the annual convention and road show of the American Road Builders' Association have set records of attendance eclipsing by far the number who have attended any other single meeting or exhibition in the engineering field. The magnitude and character of the road show exhibits also have been so remarkable that only a personal study of them can convey a true idea of their worth. In spite of these noteworthy past records, these two events at Chicago in January evidently will again set new standards.

The program for the convention will be presented by men who are in the first ranks as highway engineers and builders. Professor Agg, as chairman of the program committee, deserves especially great praise for the fact that he had definite acceptances a month and a half before the convention from all who are to present papers. This means the elimination of last-minute efforts by the authors. It also should mean that there will be more discussion than in the past, due to the time that those interested will have to consider the subjects.

It is difficult to overstate the outlook for the road show. Last year that great industrial and material machinery exhibition was thought by some to have reached its zenith. This year, however, the demand for space for heavy machinery has been twice, and for exhibits of unlimited height four times the total applications received last year. While there have been many new concerns desiring space, the great increase has come from former satisfied exhibitors.

In spite of the large oversubscription of space, all except a few applicants will be able to show their products. The joint committee in charge of the award of space has accomplished this only by the most careful, painstaking work. The result will be an exhibition of construction machinery, equipment, tools and materials which no man in any way seriously engaged in outdoor construction work or bulk-material handling can afford to miss.

### A Good Finish

AT the end of September the number of contractors in the cold weather States who faced going broke was larger than at any other time in many years. In fact, in some lines of work where good weather is

necessary, most of the contractors were at or beyond the ragged edge. Never before were the collections of manufacturers of equipment and material producers so slow and uncertain as in August and September. Then the long run of fine, dry weather in October saved the day for many an outfit. The year will turn out as good as the average, in spite of the late spring and the very unusual amount of rainy weather during the summer.

One important lesson was learned from this year's experience by many a concern. That was that the outfits which had proper equipment, and enough of it, were able to make the grade when the chance came. Many of those who worried along with hay-wire machines, or who put off buying a good piece of equipment or two, came to rue such procedure when days in October meant a good year or going broke. As a result there will be more and better equipment on the job early next spring than ever before. The coming serious labor shortage also will have its effect to that end.

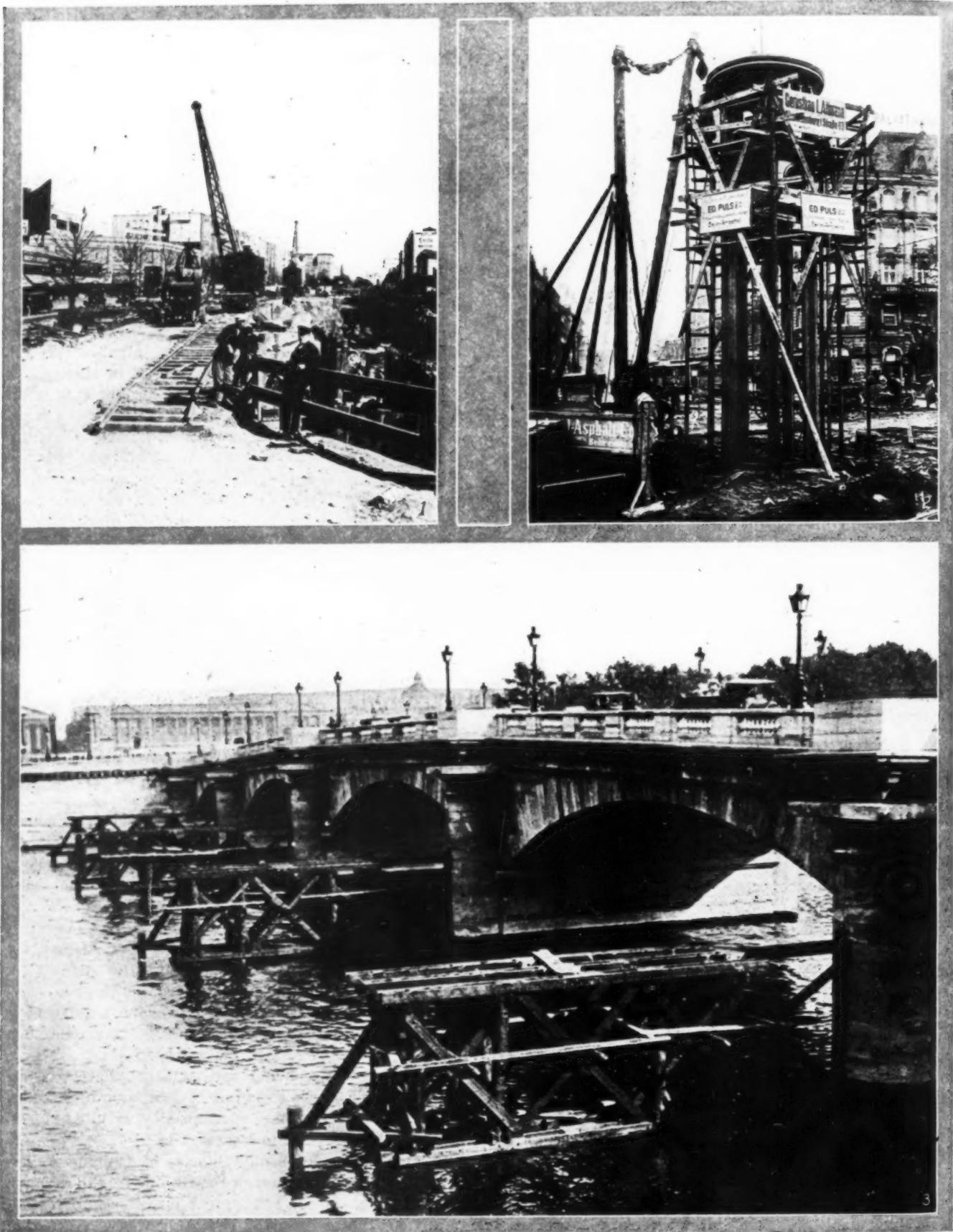
### Putting Business Into Research

TO most of us the word research smacks of horn-rimmed spectacles, long hair and theory. But big business has found that research pays. In practically all lines of construction work, and particularly in highway building and maintenance, research has made our progress possible. The business and the theory in highway research have, however, not been mixed as they should.

The meeting of the Highway Research Board at Washington, Dec. 4 and 5, promises to be the start of a movement that is sure to put more business into research work in that field. In fact, the program of that meeting should convincingly demonstrate that research is more than "pure science." It should bring out that research has to do with many of our every day problems. It should further show that the Highway Research Board's plan of coordination of the highway research work being sponsored by various interests is highly desirable to all concerned.

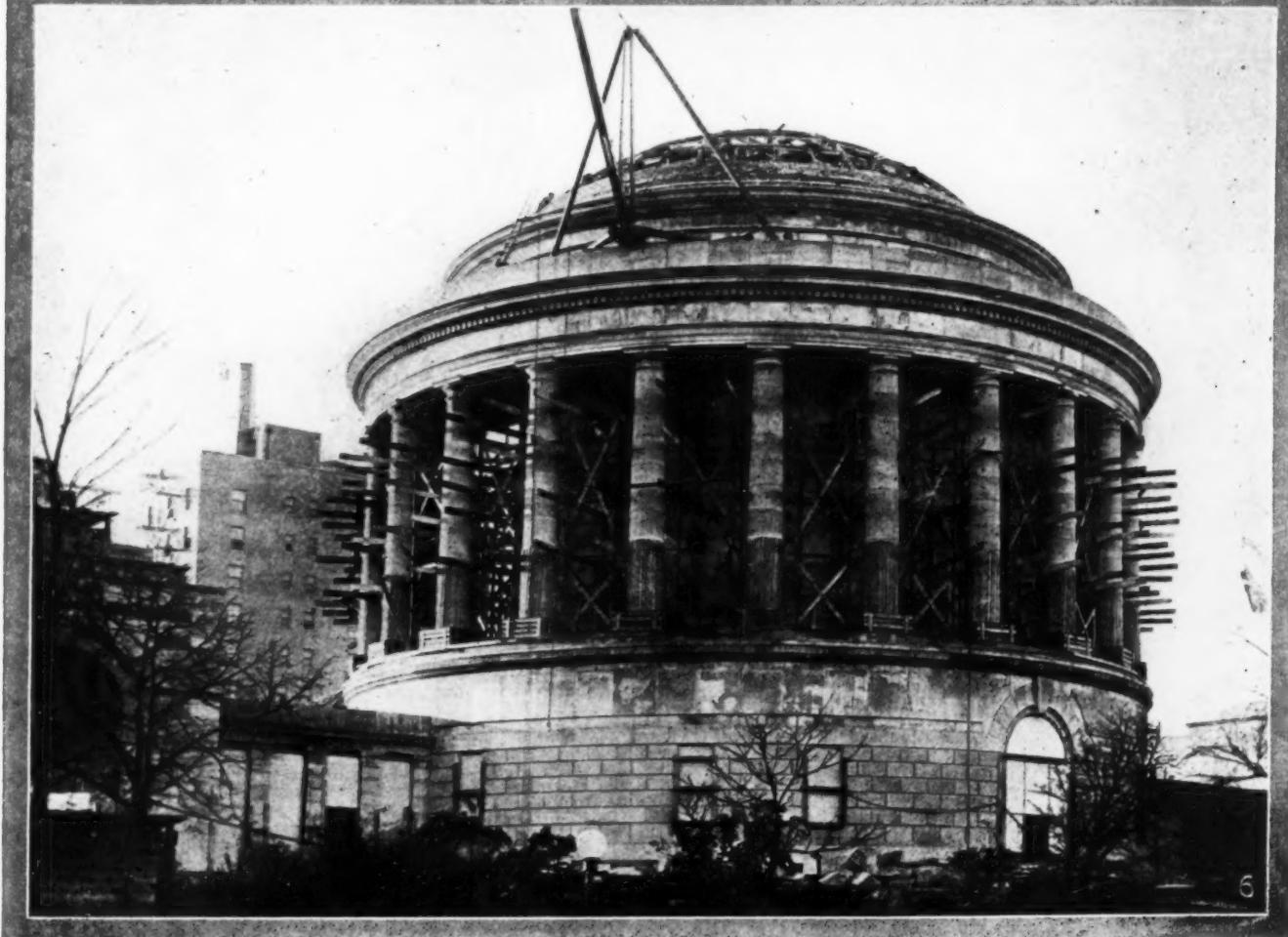
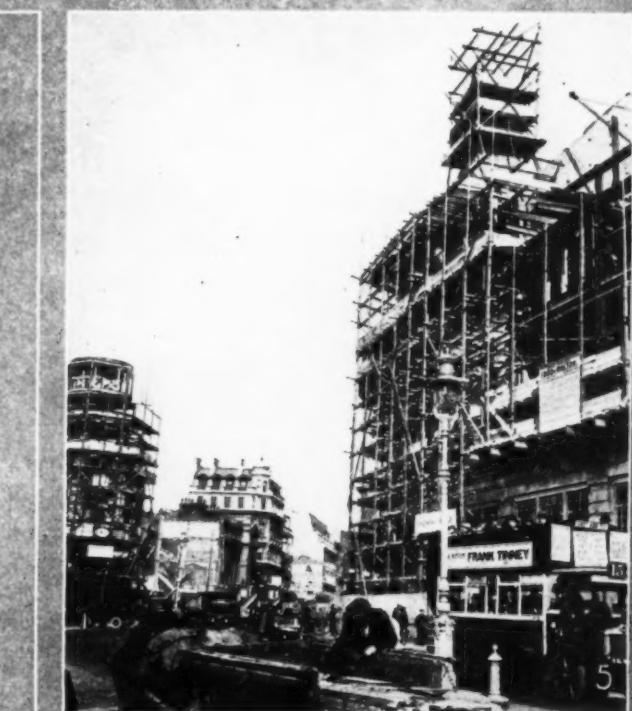
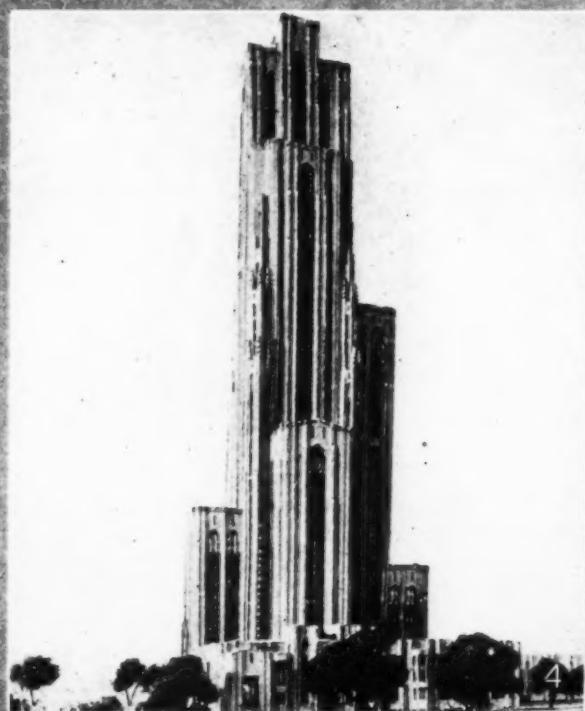
Under the leadership of Charles M. Upham as director, the Highway Research Board bids fair to do a very effective job. It can readily put business into research and take the awe out of the subject for a lot of us. And when that is done we can count on seeing some real progress.

## Solving Old Traffic Problems



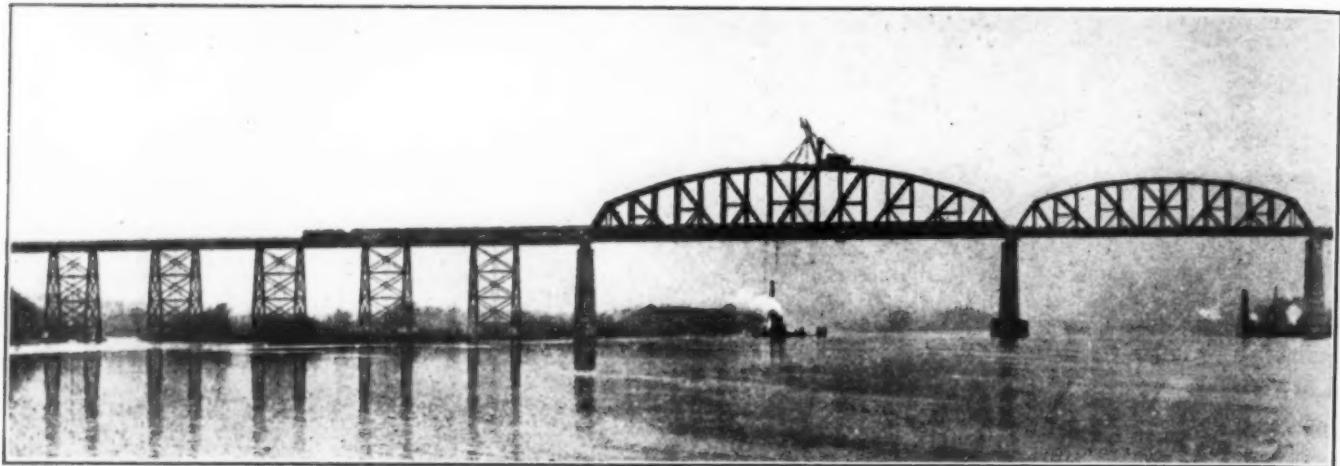
1. Eliminating a bad street intersection in New York City. Separating the grades of the Grand Concourse and Fordham Road. © Ewing Galloway
2. Berlin is trying out the traffic tower scheme which has been used successfully in American cities. This is the German capital's first traffic tower situated in Potsdamer Platz. © P & A Photos
3. Motor traffic in Paris has increased so greatly that the Concorde bridge has been given over entirely to automobiles and an addition for pedestrians is being constructed alongside. © P & A Photos

## New Buildings in Three Cities



4. The architect's idea of the new skyscraper college planned by the University of Pittsburgh. © Underwood & Underwood  
5. Regent Street in London is in the throes of a building boom. This photograph shows the construction activity on that thoroughfare. © Keystone  
6. The new Elks' memorial which is going up at Diversey Boulevard and Lakeview Avenue, Chicago. It will commemorate the sacrifice made by those Elks who lost their lives in the great war. © Underwood & Underwood

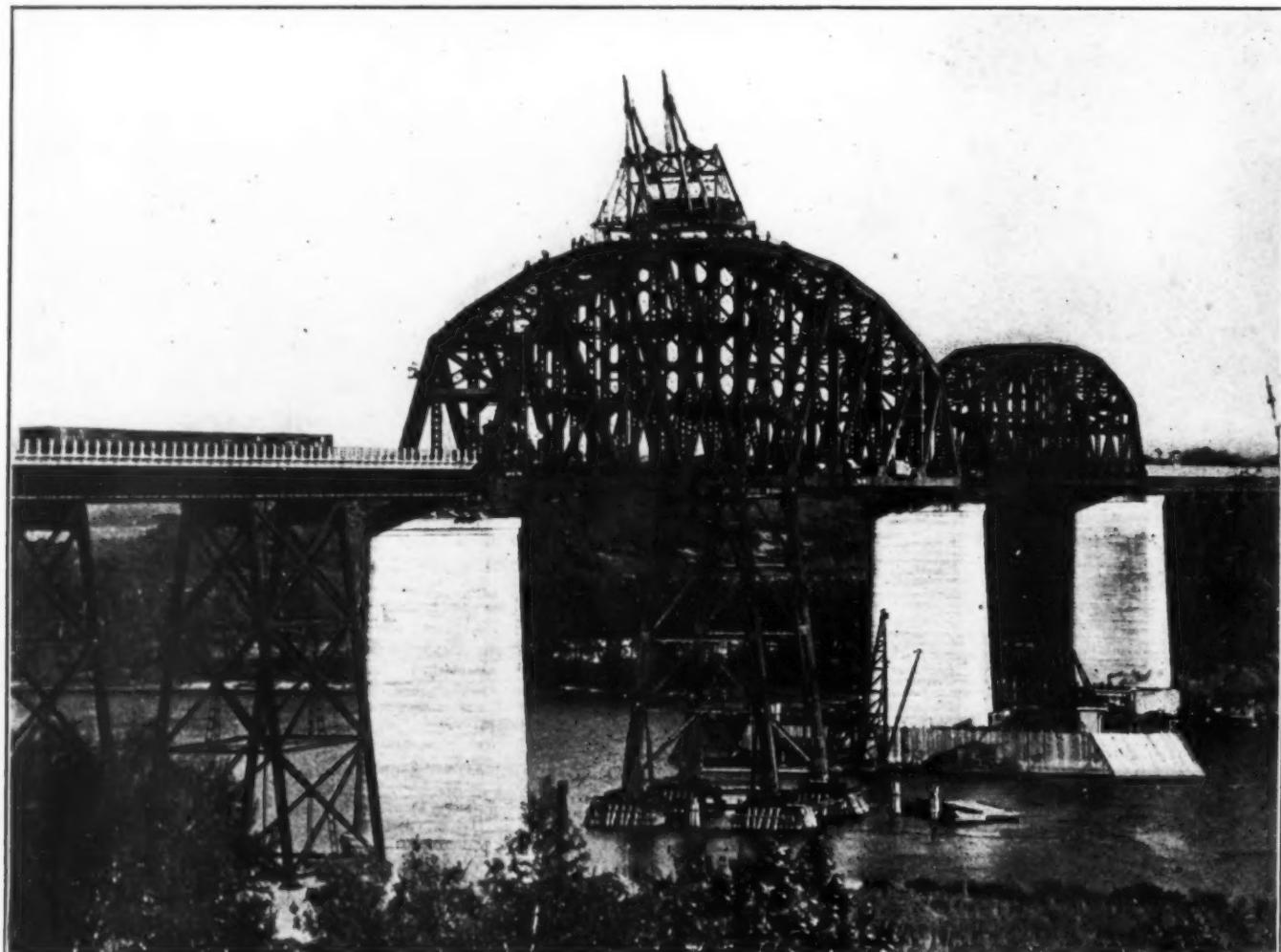
## CASTLETON BRIDGE OFFICIALLY OPENED



FIRST TRAIN OVER NEW YORK CENTRAL STRUCTURE CARRIES LOAD OF RAILWAY PRESIDENTS

ONE of the notable bits of railroad construction work since the war was officially opened on Nov. 20, when in the presence of a gathering of railroad executives from all over the country the first train was sent over the Smith Memorial bridge over the Hudson River at Castleton. This great structure, named in honor of the late A. H. Smith, president of

the New York Central Railroad, is built over a 28-mile cutoff constructed by the New York Central which connects both the Boston & Albany Railroad and the Hudson River Division of the New York Central on the east side of the river with the West Shore Railroad on the west side, and then goes on to join the main line of the New York Central just beyond



THE SMITH MEMORIAL BRIDGE UNDER CONSTRUCTION

© Kadel &amp; Herbert



CELEBRATING THE OCCASION WITH A PARADE UP CAPITOL HILL IN ALBANY

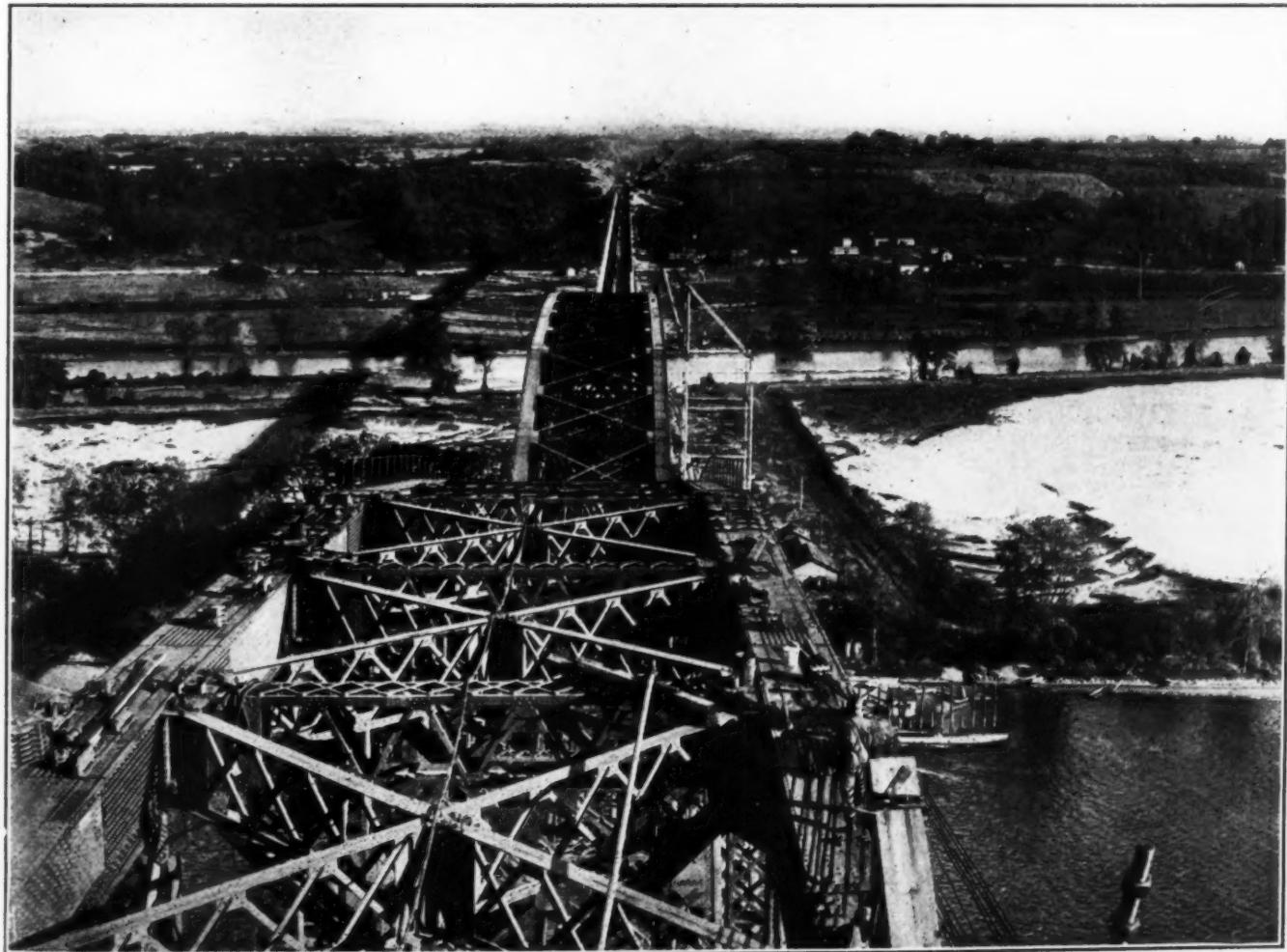
© International

Schenectady. A big freight yard is included. This freight yard, which is situated at Selkirk, just before the connecting road joins the West Shore, is built according to the most up-to-date practice and contains about 120 miles of track. It will enable the New York Central to avoid the difficulties which it has experienced in the past at Albany and will pro-

vide reclassification yard for all freight shipments from the West.

The new yard, when finished, will have a capacity of 11,000 cars and will handle the business of the West Shore and Boston & Albany railroads as well as the main line of the New York Central.

An ice plant with a production of 50,000 tons for



THIS PHOTOGRAPH WAS TAKEN FROM THE TOP OF THE BIG BRIDGE

© Kadel &amp; Herbert

icing cars, a large number of stock feeding bins and a car repair yard with a capacity of 400 to 600 cars, are included as adjuncts to the new yard.

The gravity system will be used in classifying the cars which pass through the yard.

The new bridge is a mile in length and consists of one 600-ft. and one 400-ft. span over the river channel, and steel viaducts from the sides of the valley to the channel spans. The main spans of the bridge are 135 ft. above high water.

The photographs accompanying this article show the new bridge from various points and give an excellent idea of its construction.

The work was done under the direction of G. W. Kittredge, chief engineer of the New York Central Railroad; J. W. Pfau, construction engineer; R. E. Daugherty, designing engineer; J. H. Van Buskirk, mechanical engineer, and H. T. Welty, engineer of structures. Olaf Hoff was the consulting engineer on the design of the bridge. Directly in charge of construction was W. F. Jordan, principal assistant engineer of the New York Central, and B. C. Martin and B. W. Farnum, resident engineers. The Walsh Construction Company handled all of the work except the steel and the bridge itself was put up by the McClintic-Marshall Company.

## LOADER PICKS UP LOOSENERD SUBGRADE

### Follows Scarifier and Makes Big Saving Over Hand Labor

LOADING concrete material which already has been loosened by a scarifier is the job of the bucket loader shown in the photograph below. It is operated by the Charlevoix Abstract & Engineering Company, at Reed City, Mich., and maintained an average of 50 cu. yd. an hour every working day for the entire job.

On this same work last year hand labor was used, and the maximum day's loading was 125 yd. The bucket loader increased this day's run to 479 yd. and might have done better if more trucks had been available. R. H. Sloan is the present superintendent of the company doing this work.



PICKING UP LOOSENERD SUBGRADE ON STREET RECONSTRUCTION JOB

## A GOOD IMITATION

### Contractors Reproduce Hand-Chipped Stone Effect in Concrete Building

**A** CLEVER use of sand moulds effectively solved an unusual problem in veneered concrete block construction and enabled the J. W. Sadler Company, a contracting and engineering firm of Portland, Ore., to construct at a considerable saving of time and money for the city a machinery house of concrete which was an almost perfect duplicate of a nearby rough veneered stone building. The concrete structure materialized the builders' desire to imitate the physical

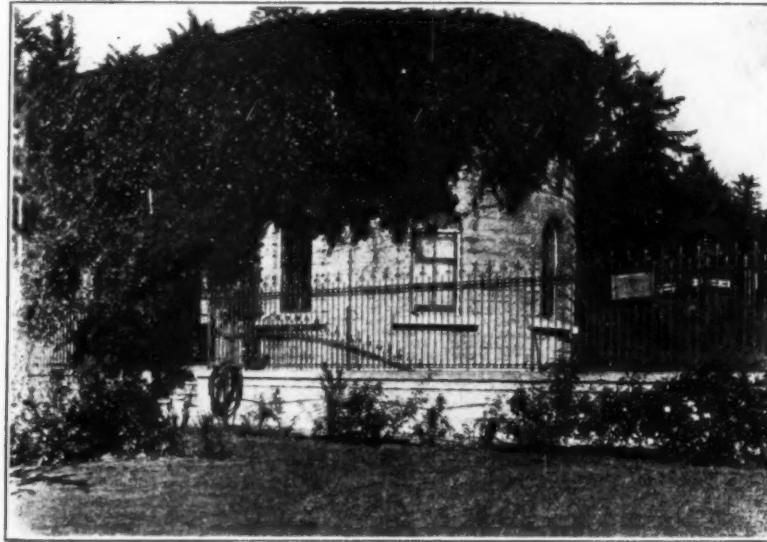
that had been appropriated for the building, but the resemblance of the new gate house to the venerable physical aspect of the stone meter house was decidedly striking.

This remarkable simulation of the appearance of stone was brought about by the use of the sand molds. A certain amount of the sand that was used in them mixed with the veneer of each cement block and produced a soft grained velvety sand finish that was not unlike the appearance of stone.

The contractors used a 1-2-4 "mud" in pouring the cement blocks. This was a much less expensive formula than could have been satisfactorily veneered by hand chipping. The patterns for the molds in which the veneered blocks were cast were made of a combination of Portland cement and plaster of Paris.

The cost of construction of the new gate house was further kept down by first building up the skeleton of the house with the cast blocks and then pouring the main cement wall against the inner surface. This method obviated the necessity for forms on the exterior surface of the pouring, while anchors of wire and short steel rods projecting from behind and between the cement blocks effectually bound the veneer skeleton to the main wall.

A careful check of costs for the complete



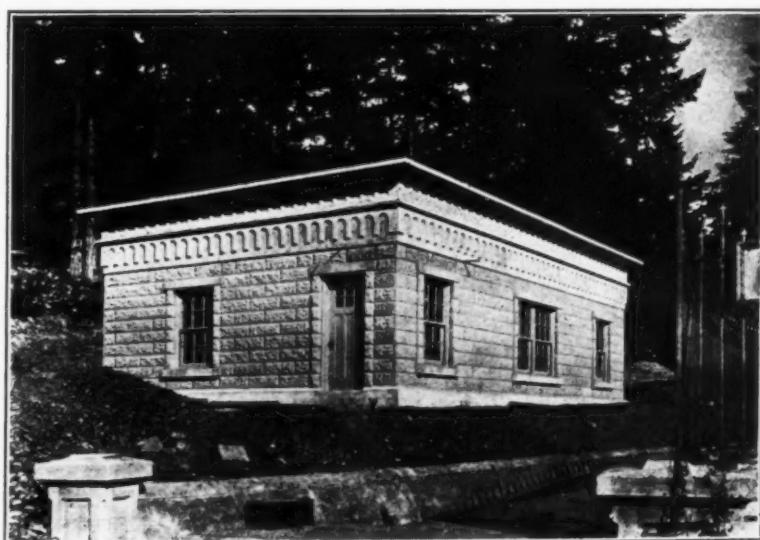
OLD BUILDING CONSTRUCTED OF HAND CHIPPED STONE

aspect of the hand-chipped stone building.

When the specifications were drawn up for this new building, which is an intake gate and screen house at the outlet of the new Bull Run River pipe line that is being installed to increase the municipal water supply, the city planning bureau decided that it should be built to present a physical appearance identical with that of a meter house that was close by.

The meter house had been built many years before, when the cost of labor and material was much lower than it is today. Furthermore, the veneered stone surface of the building had been chipped out by hand. As the adaptation of such a procedure to the proposed building would far exceed the sum of money that the city had appropriated for the job, it was held that some sort of cement effect would be the best substitute. So it was up to the contractors to do their best.

The construction company engaged L. E. Bufton, who is a builder specializing in cement block work. Under Bufton's direction the required rough veneered cement blocks were cast on the site of the proposed building. After this start the work went forward in a way that surpassed expectations, for not only was the cost of construction held well within the amount



THE NEW STRUCTURE IS BUILT OF CONCRETE

job of building the new gate house revealed that the work had been done for \$1,800 by using the sand method of casting the veneered concrete blocks. Had the hand method of veneering been used it was estimated that the job would have cost at least \$5,000. The photographs on this page furnish sufficient proof that the desired result was accomplished.

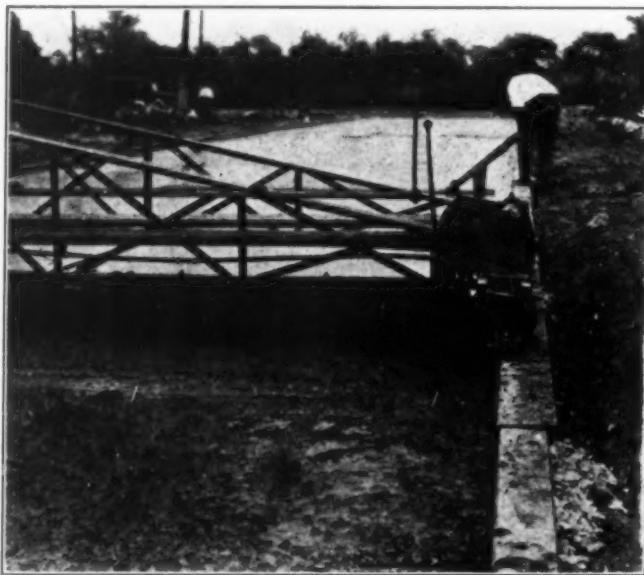
## FINISHER USED FOR STREET WORK

Machine Travels on Steel Plates Laid on Curbs—Makes Good on Unusual Job in Ohio Municipality

THE use of a tamping and finishing machine for the construction of concrete pavements in cities is unusual. The Village of Bedford, Ohio, which is near Cleveland, which has embarked on a program of street construction, has specified that on the streets built of concrete the concrete be spread and tamped mechanically.

The two photographs on this page show how the finishing machine has been adapted to this work. As the usual steel forms used in building concrete through country districts are not necessary because of the presence of the curbs, it was decided to let the finishing machine travel on the curbs. In some cases the curbs were of stone and in others of concrete, but in all instances the same procedure was used. Steel plates about 10 ft. long bent to an angle shape were laid along the top of the curb to protect it. Four such plates on each side of the pavement were sufficient to take the finisher far enough for the plates to be picked up and relaid ahead of it.

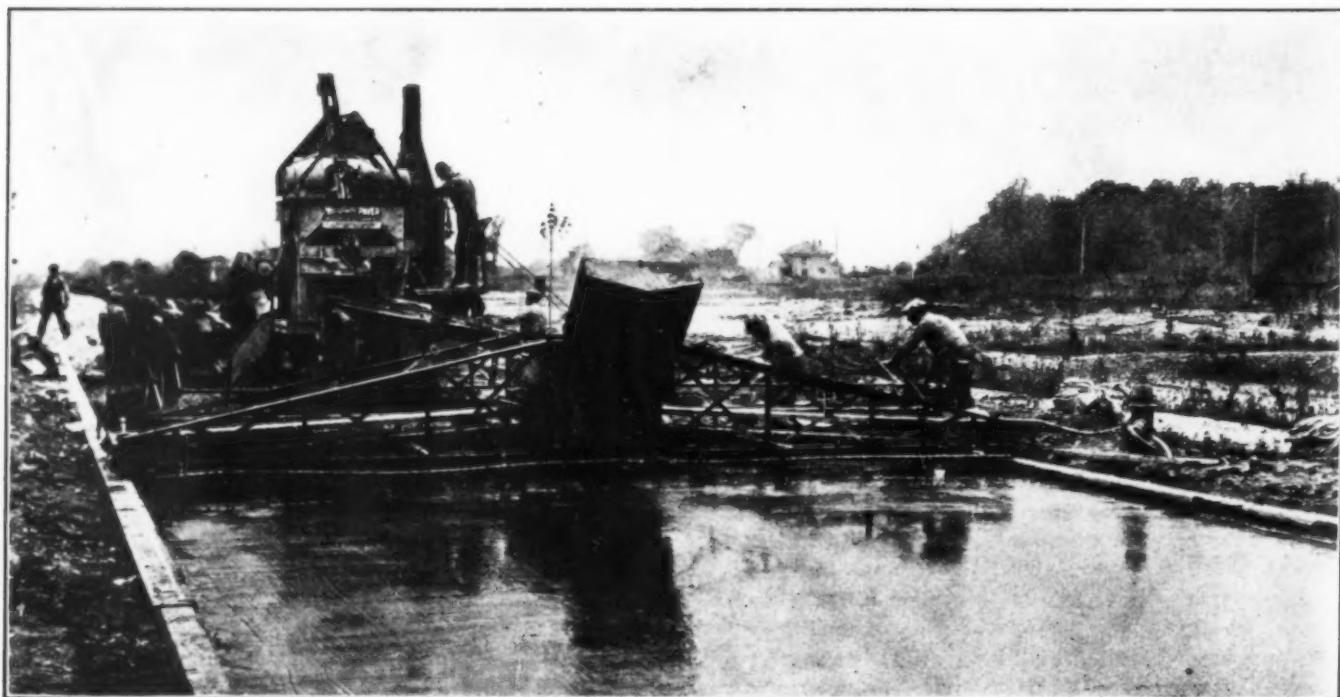
It also was necessary to make a couple of slight



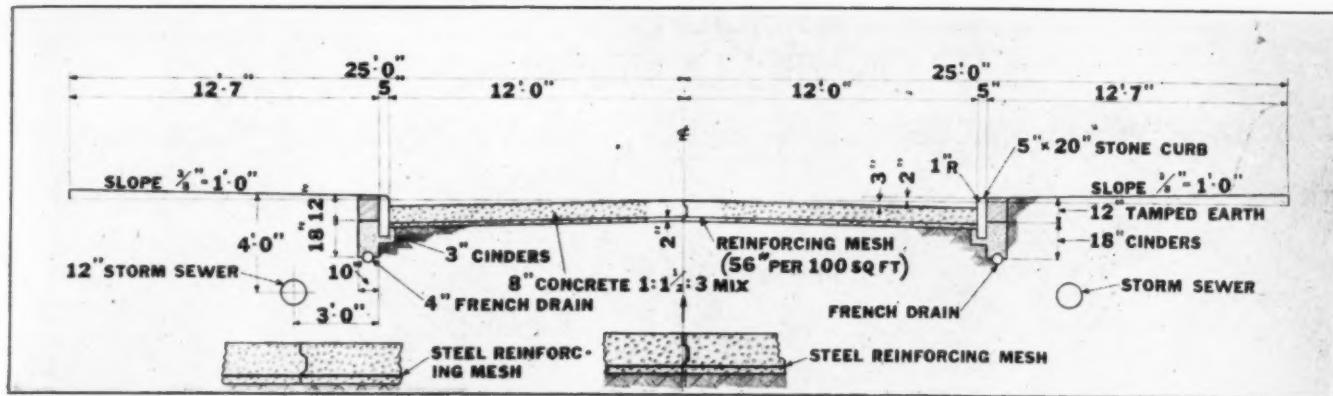
THE FINISHER TRAVELED ON STEEL PLATES LAID ON CURB

changes in the machine because of the fact that the curbs were higher than the steel forms on which the finisher was designed to travel. Both the strike-off and tamper were fitted with extensions so that they would operate properly under the unusual conditions. It was impossible, however, to use the regular finishing belt of the machine, as the curb did not allow room for clearance. The final floating of the surface was done with a wooden float extending the full width of the pavement and provided with plow handles on each end. After the mechanical finisher has spread and tamped the job, one or two trips over it with a wooden float finished it.

The diagram at the top of page 9 shows the design of the pavement and the conditions which had to be met. The work has been proceeding under the direction of B. F. Wright, Village Engineer, and has resulted in a slab of greater density and with a smoother surface than can be obtained by hand methods. The finishing machine has operated efficiently despite the unusual situation in which it had to work, and Mr. Wright is well



PAVER AND FINISHER BUILD CITY STREETS



CROSS SECTION OF NEW PAVEMENT

satisfied with his decision to depart from the usual practice in city paving.

The laying of concrete pavements in cities always has presented problems to both the contractors and manufacturers of paving equipment, and the work

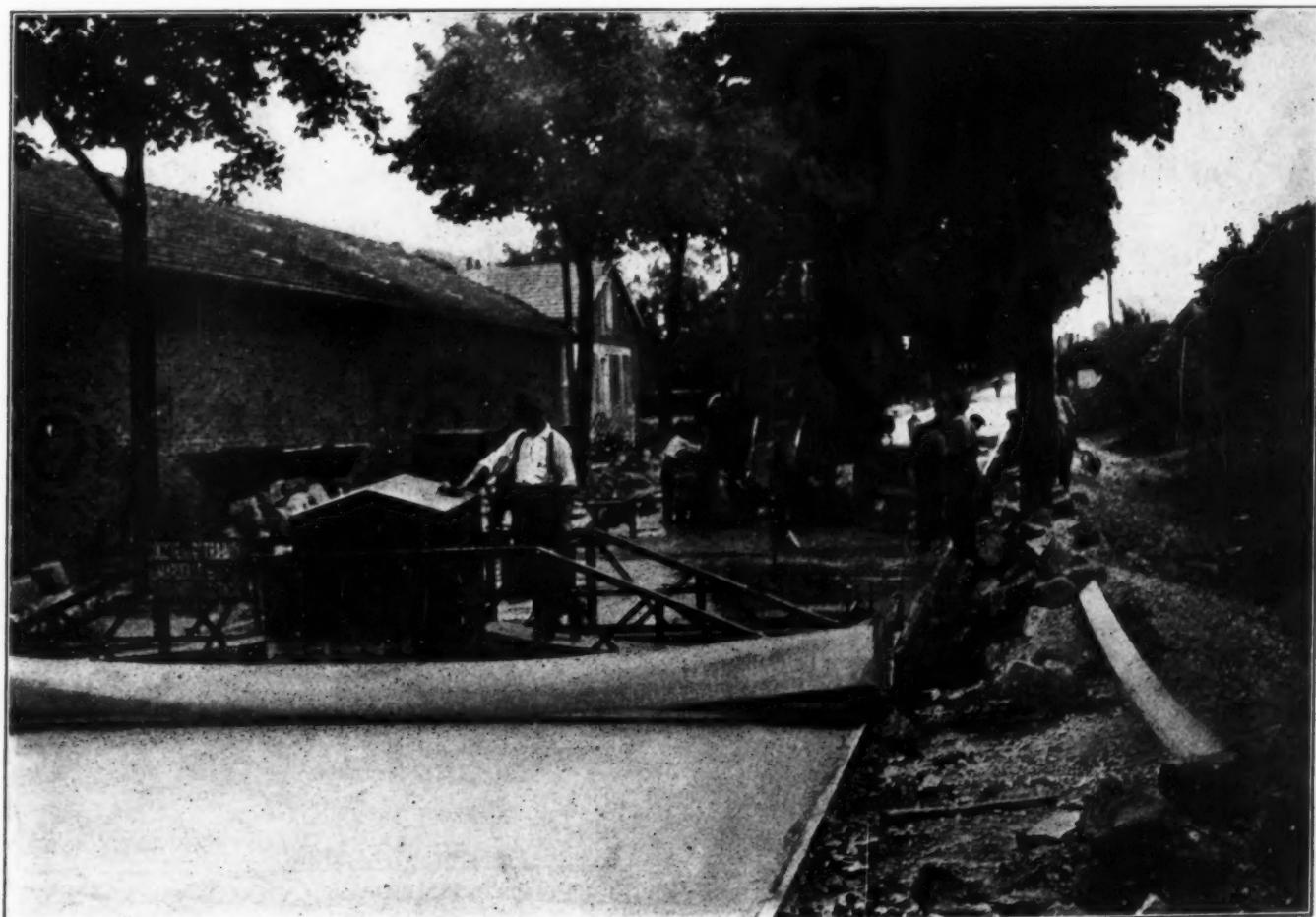
now being done in Bedford is an indication that at least one of these problems is close to a solution. The adaptability of finishing machine to work like this means that the mechanical tamper can be used in places hitherto considered impossible.

## CONCRETE ROADS IN FRANCE

### American Machines Used in Construction of New Surface

JUST two years ago, in the December, 1922, issue of *SUCCESSFUL METHODS*, an article was printed describing the building of a concrete road in France with American machinery. The French were so well pleased with the new road that they are going ahead

and building others. The photograph below shows the construction of a concrete road between Bry sur Marne and Naisy le Grand. This picture was taken only a few months ago. Both the paver and the finishing machine are of American construction.

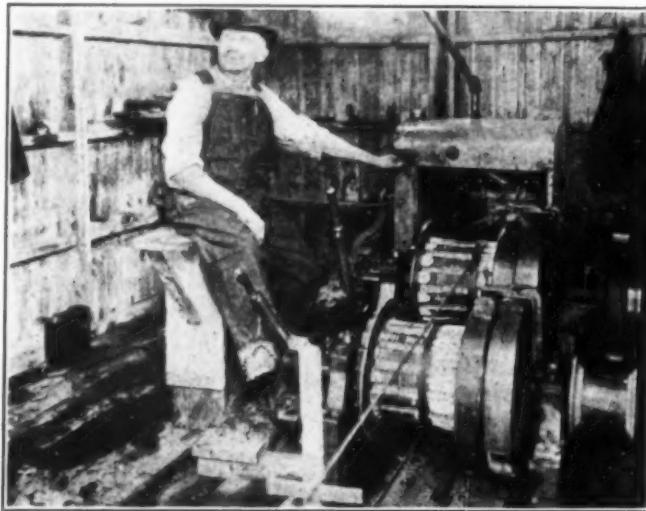


## SINGLE GASOLINE HOIST HANDLES ALL WORK ON BIG CLUBHOUSE

Proves Its Worth on Construction of New Home for Olympia Fields Country Club Near Chicago

THE construction of the modern golf clubhouse presents a real problem to the contractor. The style of architecture now in vogue for such structures calls for a rather complicated ground plan which, of course, doesn't make things any easier for the builder.

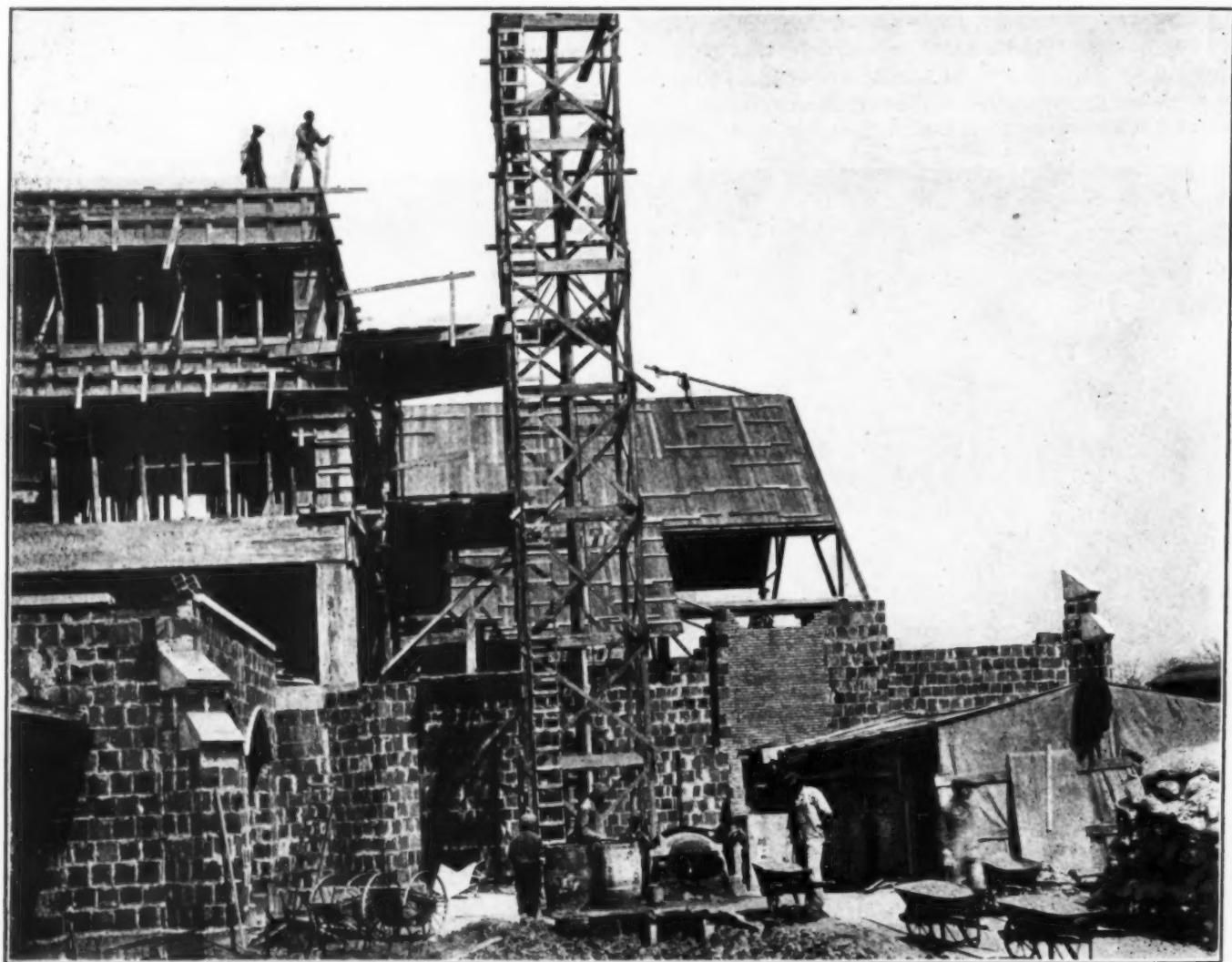
When the Dahl-Stedman Company of Chicago started the construction of the new clubhouse of the Olympia Fields Country Club, it was



EASY TO OPERATE

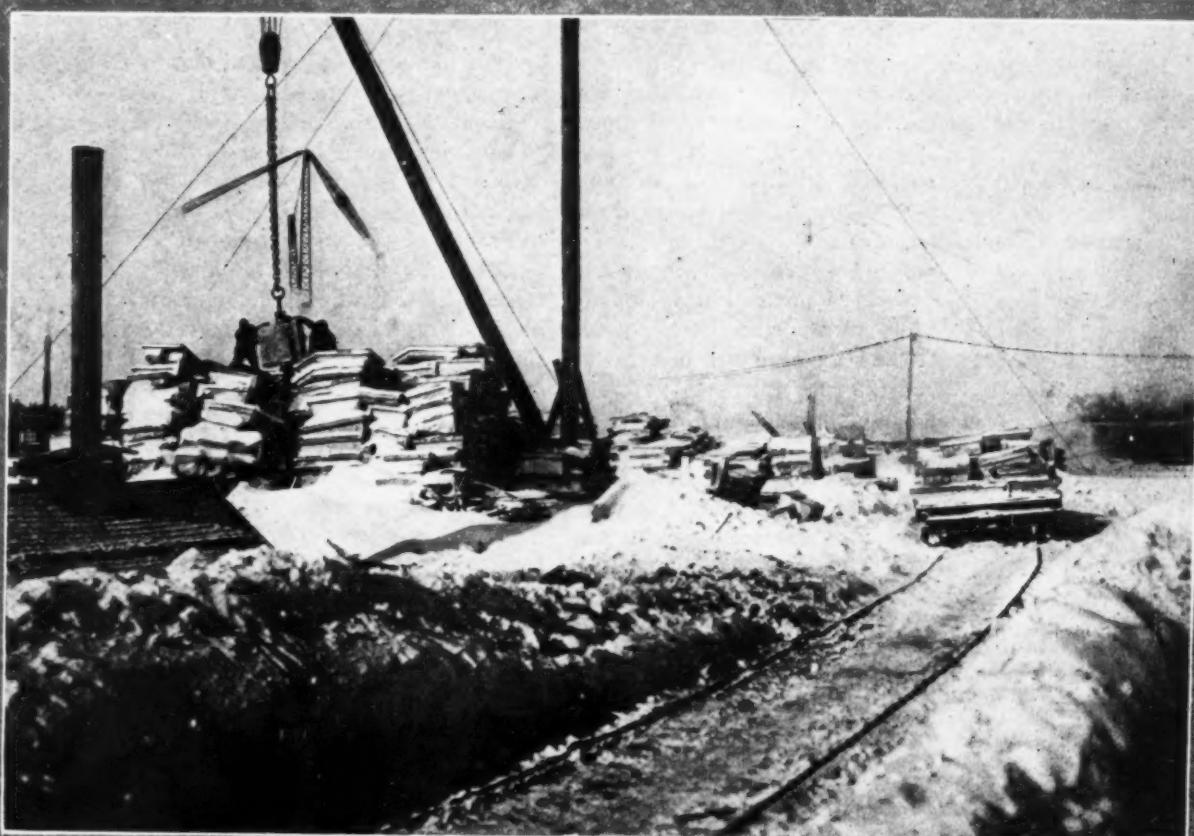
thought that two hoists would be necessary. A double drum gasoline hoist was installed, and it did so much work that it was decided that a second one would not be needed. The portability of this hoist made it easy to move wherever the elevator tower had to be set up in a new place.

The photographs on this page show the method of setting up the tower and hoist. The cost of the clubhouse is approximately \$750,000.



THIS TYPE OF CONSTRUCTION REQUIRES LIGHT BUT EFFICIENT EQUIPMENT

## "East Is East and West Is West"



© P. & A. photos

There seems to be room for everybody in the construction field, if the photographs on this page are to be believed. The upper picture shows a little mid-winter work at a quarry in Maine, operated by the George A. Fuller Construction Company of New York. The striking scene below was taken in California, where construction seems to go on under much more pleasant conditions

## RESERVOIR CONSTRUCTION IN ENGLAND

Work Begun Before the War Now Being Completed at Great Extra Cost

BY G. CROWTHER

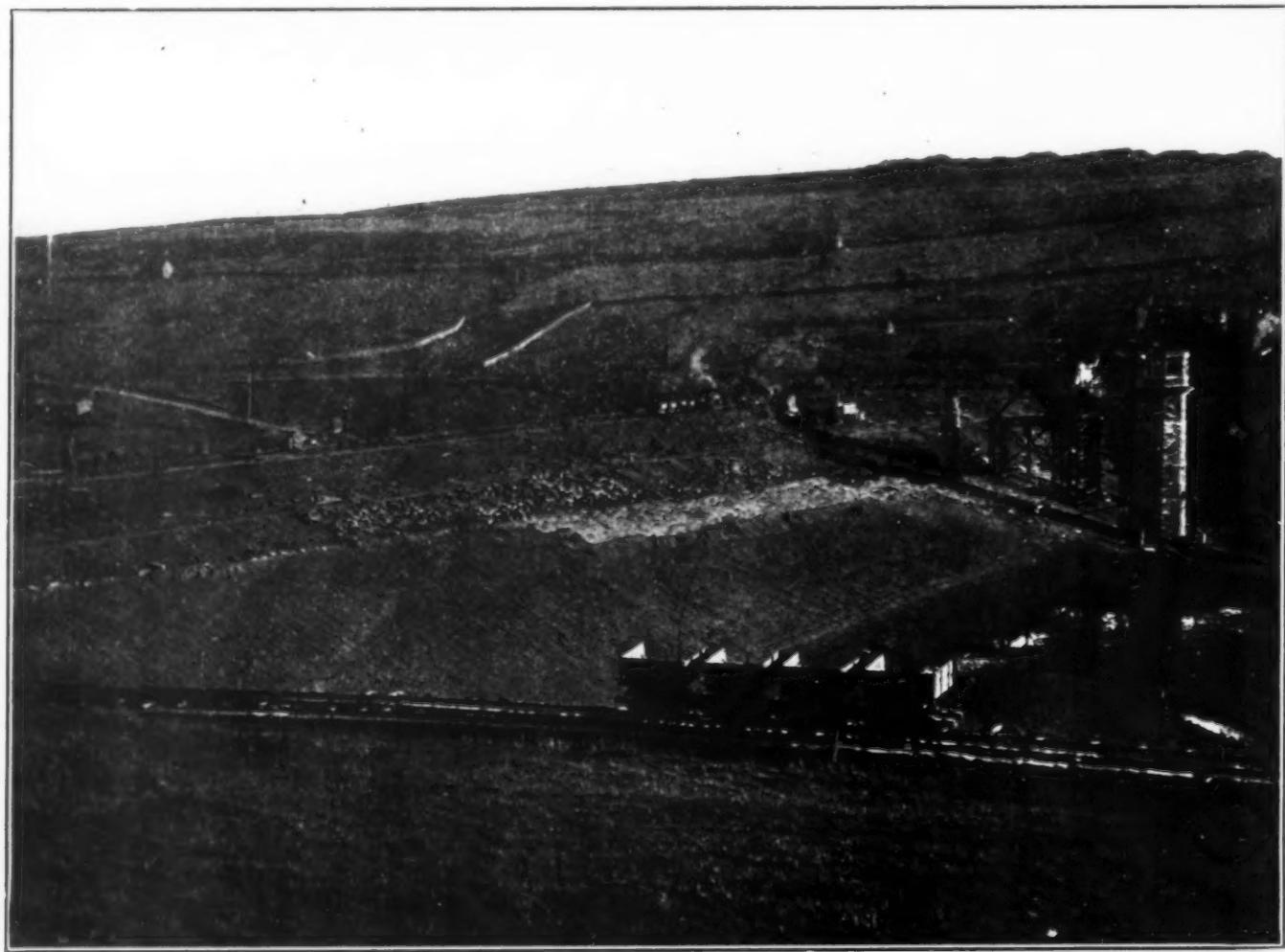
**I**N the thickly populated areas of the industrial portion of the North of England water supply problems are of vital importance and the towns and cities lie so close together that almost all the available areas for collecting water have been appropriated by one city or another. Several important schemes are now being developed on the hills which divide Lancashire and Yorkshire.

Two pictures are reproduced which show the work which is being carried out by the town of Keighley to augment its water supply. In all a population of 53,595 is supplied in an area of 15,364 acres, and although the present storage capacity of the reservoirs of the town is approximately 415,663,200 gal., about one-third of the total amount of water collected has to be given to holders of rights whose sources of supply have been interfered with by the provision of Keighley's supply. New works have been rendered necessary in view of the growth of the town, increased use of water and the prospective increase in the population resident in the water supply area.

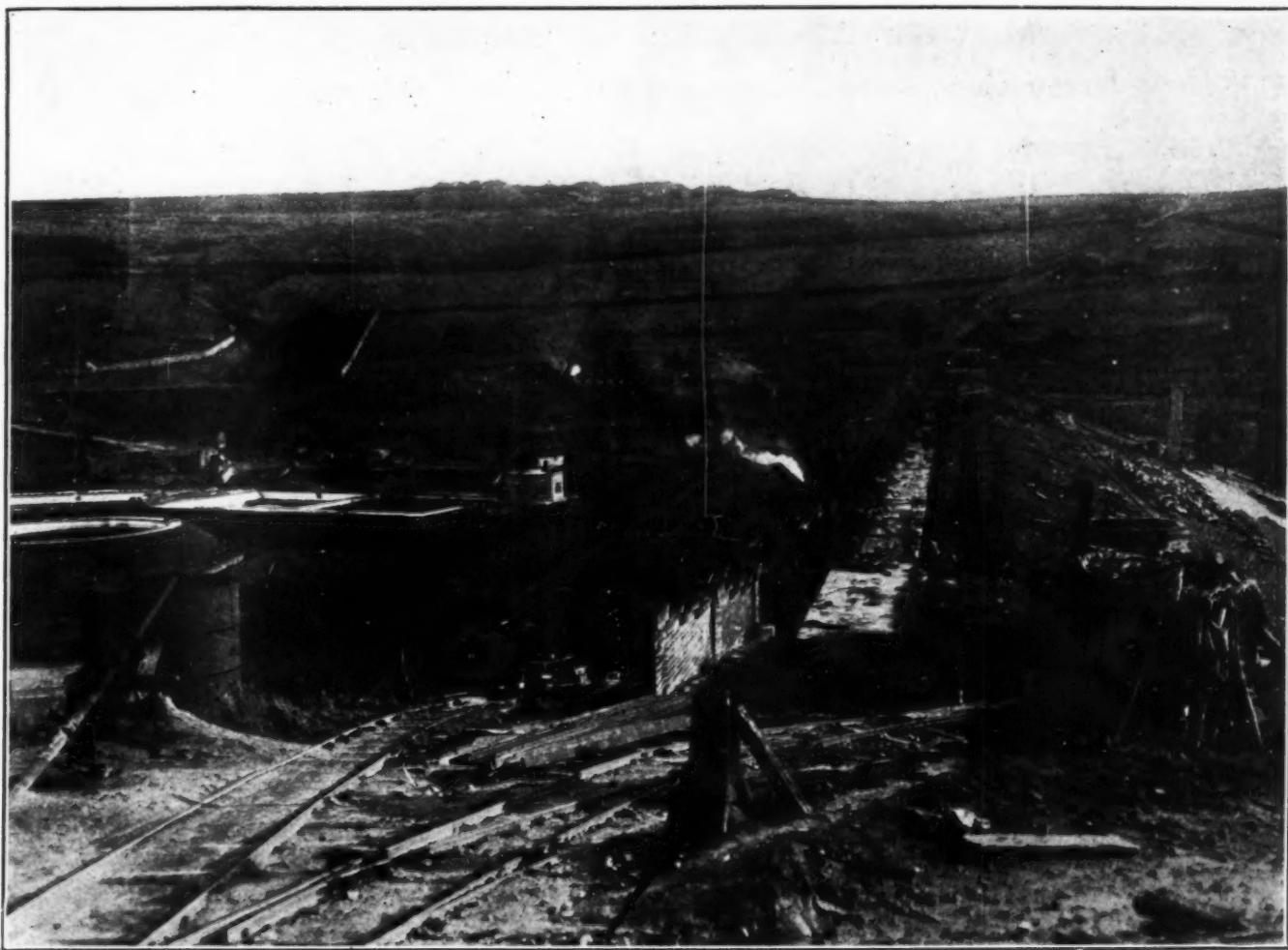
In 1910 it was proposed to construct two reservoirs,

one for use by the town and one to safeguard the rights of property and land owners who used the supply of water it was intended to divert. The trial pits on the site of one embankment which it was proposed to erect across the valley proved unsatisfactory, however, and in place of two reservoirs only one was made, this being increased in size in consequence.

Between the banks of a steep valley one big embankment is now being erected, and is in fact nearly completed, as shown in the pictures. Above the level of the stream the embankment will be 84½ ft., and from end to end will be 1010 ft., with a total width at the base of over 400 ft., tapering to 20 ft. at the top, a roadway being carried the full length. Below the bed of the stream a trench was dug for a depth of 133 ft. at the deepest portion, and the engineers were much relieved to find that the foundations here could be on a bed of water-tight shale with little fear of any leakage. The area of the water when the reservoir is full will be about 31½ acres and the storage capacity equal to 281½ million gal. For some distance concrete was used as



GENERAL VIEW OF FACE OF EARTH EMBANKMENT. IT IS 1010 FT. LONG, 400 FT. FROM TOE TO TOE AND 84½ FT. FROM BASE TO WATER LEVEL.



LOOKING ACROSS TOP OF EMBANKMENT SHOWING CONSTRUCTION OF CLAY CORE

a central wall in the embankment, but during the war the British Government commandeered all the available supplies of concrete, and limited the number of men to be employed on the work. Later a clay center was provided, a good supply of suitable clay being available on the site.

At the head of the valley, where the water collects, a small reservoir has been built to collect any silt which might come down from the collecting grounds, and arrangements are made for carrying off heavy rushes of flood water. The water will be drawn off from an octagonal masonry faced valve tower built at the toe of the inner slope of the embankment, the valve tower being 78 ft. high. This tower is seen on the right of one of the pictures. Water may be drawn off at three different levels, according to the level of the water in the reservoir, and is passed off to the filter-beds, four in number, seen at the foot of the embankment. Each filter bed is 82 ft. square, three being of sufficient superficial area to deal with the needs of the population, which is approximately 1,000,000 gal. per day.

From a clear water basin, which holds a 14 hour sup-

ply for the town, a 15 in. cast iron pipe line is laid to a covered reservoir six miles away, and this will serve the immediate needs of the portions of the town it is intended to cater to from this source. This covered reservoir is 250 ft. long by 80 ft., with a depth of 15 ft., and is divided into three separate compartments by cross walls.

Work in connection with the reservoirs and the pipe lines has been very seriously affected by the war. Men were taken away until work was kept at a standstill for a considerable period during the war, and the pre-war basis of calculations as to cost of material and wages were totally upset by war and post-war conditions. In 1912, when work was begun, the corporation at first proposed to carry out the work under its own managers, but later contractors were employed. Their contracts were broken by war conditions, however, and now that the work is nearing completion it is estimated that whereas the original cost was put at £208,750 (approximately \$950,000) the total cost will be increased by about  $2\frac{1}{2}$  times, to £520,000. It is a staggering increase but the work had to be done.

**American Road Builders' Association Annual Convention and Road Show  
Chicago, Illinois, January 5th to 9th—Don't Forget the Dates**

## MACHINES SPEED UP SEWER JOB

New Jersey Contractor Substitutes Compressed Air for Hand Labor

WHEN a contractor starts out in September to dig 35 miles of sewer trench in sandy soil he has to plan his work thoroughly. Joseph Meile of Keansburg, N. J., is now engaged on such a job.

The trench he is digging is 2 ft. 6 in. in width and varies in depth from 4 to 9 ft. As the land is low and the soil sandy, sheathing is absolutely necessary. Mr. Meile's first idea was to drive this sheathing by hand, and he even went so far as to lay in a supply of big wooden mallets for this purpose. He got to thinking things over, however, and decided that there must be some better way to do this work. The photographs on this page show the better way.



A CLOSE-UP OF THE SPECIAL OUTFIT

Paving breakers, operated by compressed air, are being used. These paving breakers are equipped with a special shoe which was constructed of such dimensions that it would fit the end of the 2 by 8 in. pile which is being used. The paving breakers were also equipped with a special cross handle.

Four of these paving breakers are in use on the job, two of them being operated from each of the two compressors.

The operation consists in digging to water level by hand or with an excavator. The sheathing then is driven 2 ft. below the water level. When the trench has been cleared to the bottom of the sheathing it is then driven an additional 2 ft.



DRIVING SHEATHING WITH COMPRESSED AIR

## CRANE WORKS ON NEW BUILDING

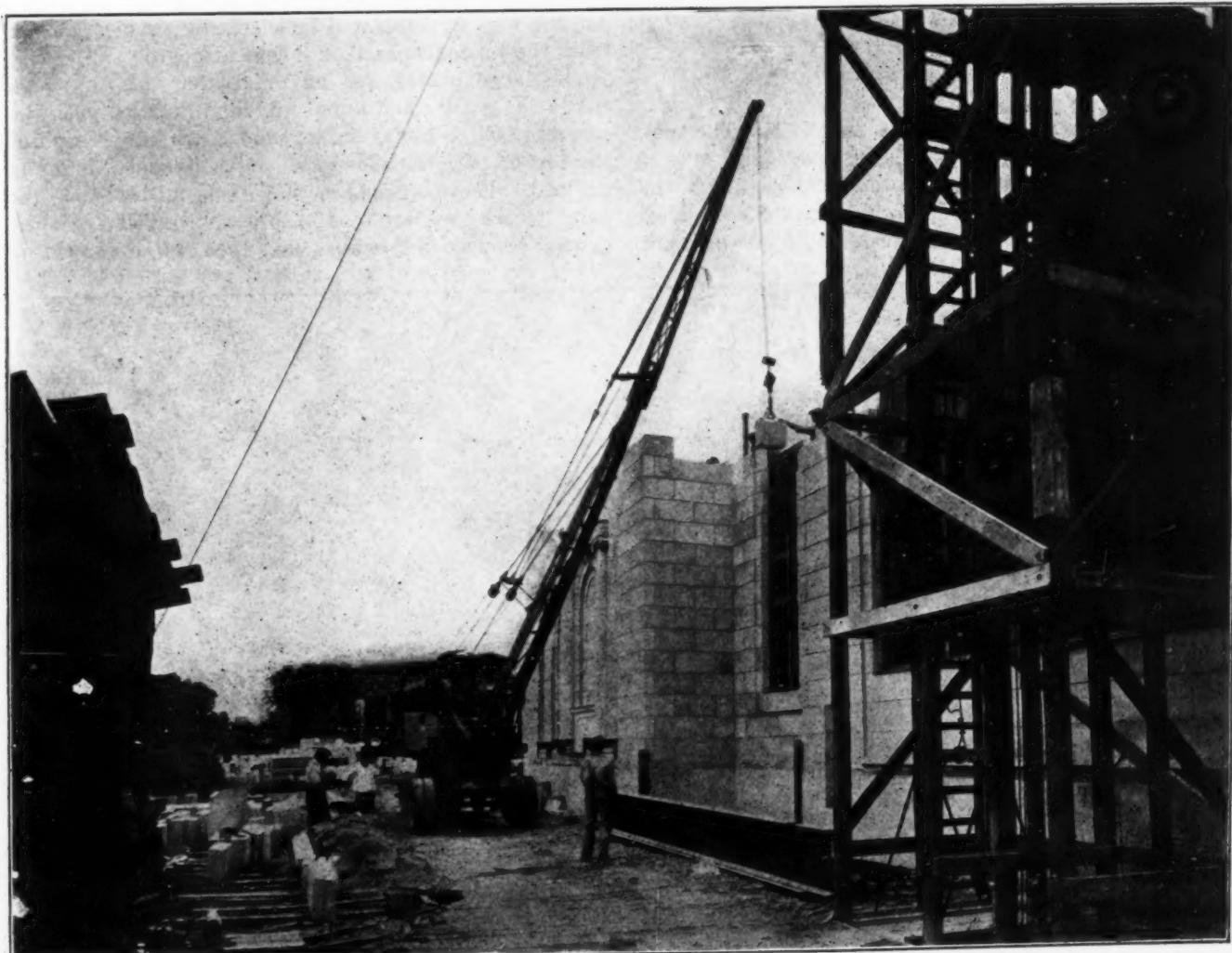
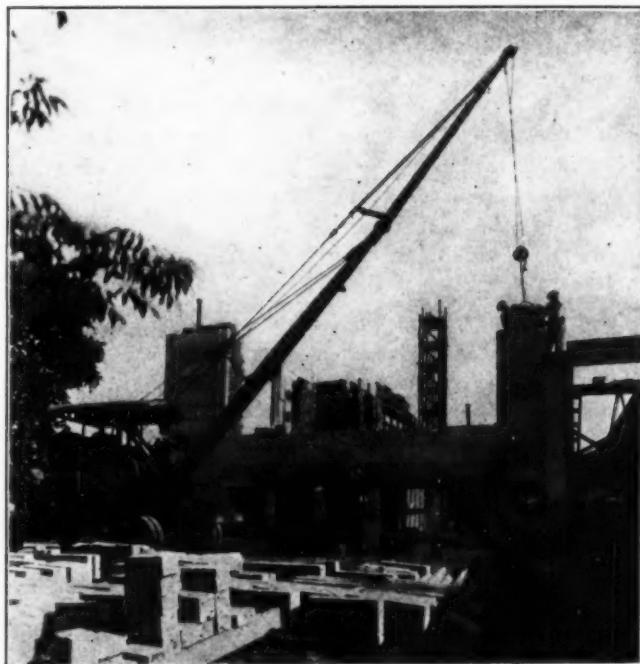
### Places Face Stone and Hoists Bricks and Concrete

GETTING material into place is always more or less of a problem in every building operation. In the construction of a group of buildings for St. Ann's School at Cleveland, a crane mounted on a motor truck was utilized for this work. Father Powers, who is an engineer as well as a priest, worked out the method used.

A roadway wide enough to accommodate the crane was cleared around the building, and the crane, which had a 24-ft. boom, was fitted with a 16-ft. steel extension and later with an 8-ft. timber extension. This gave it a total

length of 48 ft., which was sufficient to handle all of the face stone and steel work. In addition, it was used to hoist wheelbarrows of brick to the bricklayers' platform and to lift full buggies of wet concrete from the ground to the second story.

The economy in the use of the crane for this work is apparent. It could pick up face stone anywhere around the building and then move to the place where the stone was needed. The two photographs show the crane handling the stone. The lower one shows the width of road around the building.



THESE TWO PHOTOGRAPHS SHOW HOW CRANE HANDLED STONE FOR SCHOOL BUILDING

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Paving breakers, operated by compressed air, are being used. These paving breakers are equipped with a special shoe which was constructed of such dimensions that it would fit the end of the 2 by 8 in. pile which is being used. The paving breakers were also equipped with a special cross handle.

Four of these paving breakers are in use on the job, two of them being operated from each of the two compressors.

The operation consists in digging to water level by hand or with an excavator. The sheathing then is driven 2 ft. below the water level. When the trench has been cleared to the bottom of the sheathing it is then driven an additional 2 ft.



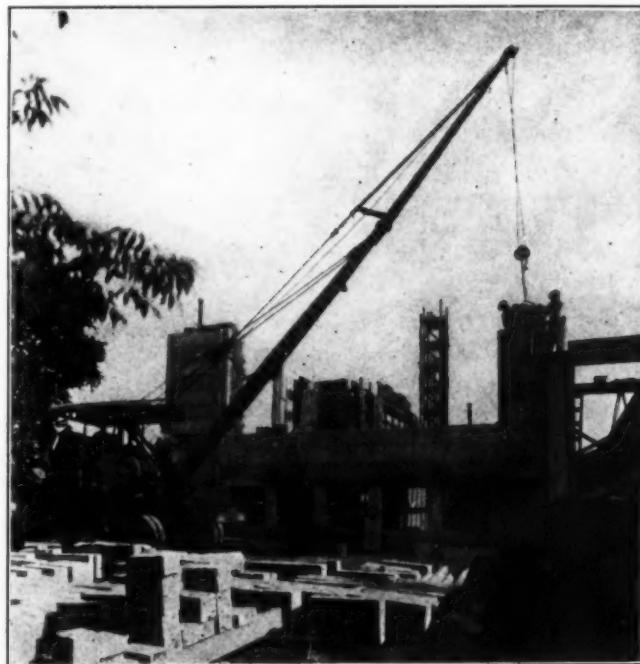
DRIVING SHEATHING WITH COMPRESSED AIR

## CRANE WORKS ON NEW BUILDING

### Places Face Stone and Hoists Bricks and Concrete

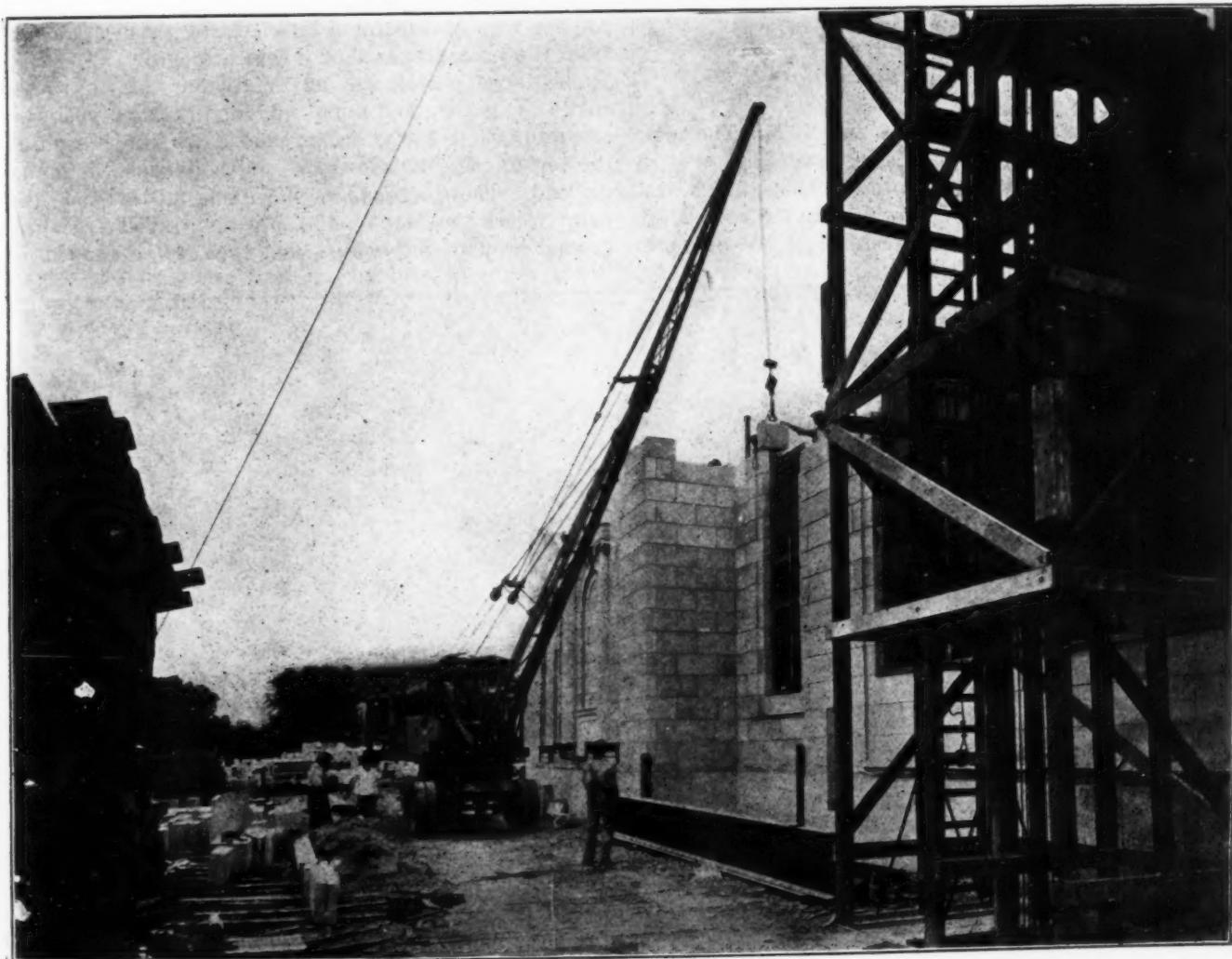
GETTING material into place is always more or less of a problem in every building operation. In the construction of a group of buildings for St. Ann's School at Cleveland, a crane mounted on a motor truck was utilized for this work. Father Powers, who is an engineer as well as a priest, worked out the method used.

A roadway wide enough to accommodate the crane was cleared around the building, and the crane, which had a 24-ft. boom, was fitted with a 16-ft. steel extension and later with an 8-ft. timber extension. This gave it a total



length of 48 ft., which was sufficient to handle all of the face stone and steel work. In addition, it was used to hoist wheelbarrows of brick to the bricklayers' platform and to lift full buggies of wet concrete from the ground to the second story.

The economy in the use of the crane for this work is apparent. It could pick up face stone anywhere around the building and then move to the place where the stone was needed. The two photographs show the crane handling the stone. The lower one shows the width of road around the building.



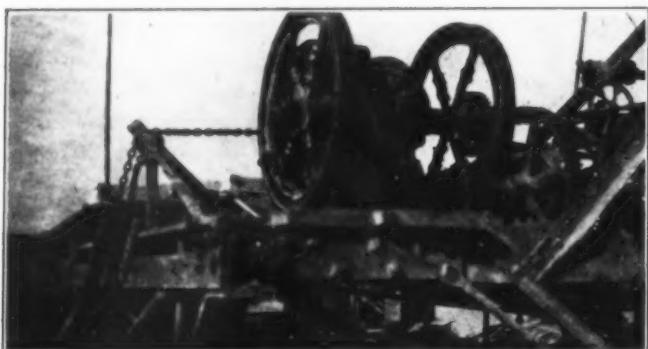
THESE TWO PHOTOGRAPHS SHOW HOW CRANE HANDLED STONE FOR SCHOOL BUILDING

## ELEVATING GRADER AND DUMP WAGONS BUILD APPROACHES TO NEW BRIDGE

Material Excavated from Nearby Hillside Used for Fills on State Highway in Michigan

**A**N elevating grader pulled by a 10-ton tractor and loading 1½-yd. dump wagons comprised the construction plant used by Donald Jeffrey in filling the approaches to a concrete bridge over a railroad east of Saline, Mich. This bridge is on a 3½-mile section of the Michigan State Highway known as M23, which when completed will be the shortest route between Detroit and Chicago. Mr. Jeffrey's contract includes the construction and grading of this 3½-mile section in

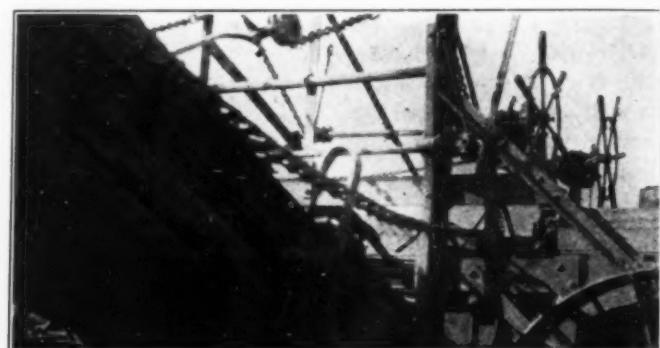
when he encountered a stratum of loose sand which did not furnish enough traction to operate the belt on the elevating grader. Mr. Jeffrey got around this difficulty by equipping the grader with a device of his own inven-



SPECIAL DEVICE KEPT BELT MOVING

order to get it ready for paving during 1925. The construction includes 86,000 cu. yd. of excavation.

The fills for the bridge approaches are 35 ft. in height, and in order to get the material Mr. Jeffrey excavated a hillside close by. He ran into one problem



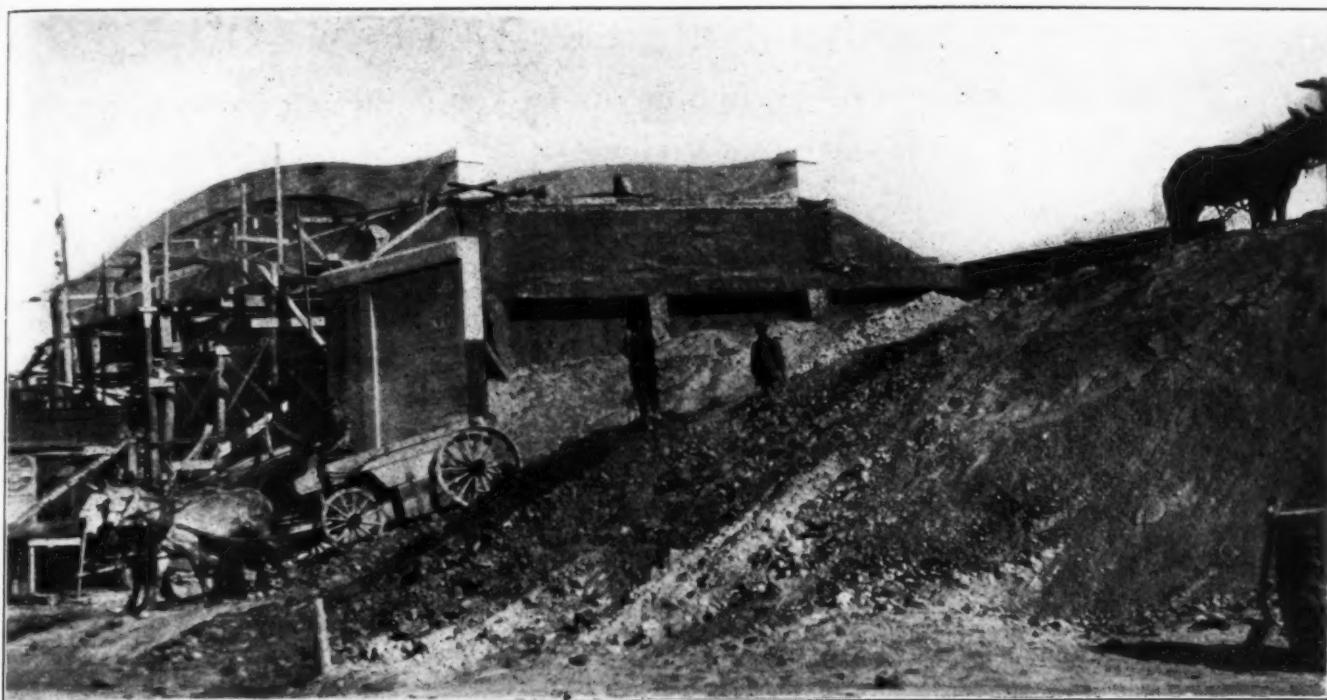
ANOTHER VIEW OF MR. JEFFREY'S ATTACHMENT

tion, which is shown in the two small photographs. Anyone who has operated an elevating grader can see from the photographs how it was attached.

The large photograph at the bottom of this page shows the grader and dump wagons in action, with the concrete bridge in the background. The photograph at the top of page 17 shows one of the wagons dumping its load. These wagons ascended the fill at above the point where the new road will begin its rise from the ground level to the bridge, and then, after depositing



ELEVATING GRADER LOADING WAGONS



WAGON LEAVING LOAD ON SIDE OF FILL

the loads, made a shortcut down the side of the fill. It was rough going, but they stood up under the work. The grader and the dump wagons also were used by

Mr. Jeffrey on other parts of his 3½-mile section of State highway. They finished the job in good shape and are ready for next year.

## MICHIGAN OFFERS HIGHWAY COURSES

THE University of Michigan has announced its annual schedule of short period courses in highway engineering and highway transport. These courses are given during the winter months so that men who are engaged in the actual building of highways during the spring, summer and fall months may take the courses without interfering with their work.

The schedule covers seven two-week periods and any courses may be taken independently of all the others. Anyone interested in these courses may obtain full information by addressing A. H. Blanchard, Professor of Highway Engineering and Highway Transport, University of Michigan, Ann Arbor, Mich. The schedule of courses is as follows:

### DECEMBER 8 TO 19, 1924

C. E. 77. Highway Engineering Financing, Management and Organization. Professor Swinton.  
C. E. 81. American and English Highway Transport Methods. Professor Blanchard.

### DECEMBER 22, 1924, TO JANUARY 2, 1925

C. E. 67. Highway Transport Economics and Surveys. Professors Blanchard and Swinton.  
C. E. 72. Gravel and Quarry Plants, and Gravel and Broken Stone Roads. Professor Morrison.

### JANUARY 5 TO 16, 1925

C. E. 73. Brick, Cement-Concrete, Stone Block and Wood Block Pavements. Professor Morrison.  
C. E. 76. Highway Engineering Theory and Design. Professor Swinton.  
C. E. 80. Interrelationship of Highway, Railway and Waterway Transport. Professors Riggs and Worley.

### JANUARY 19 TO 30, 1925

C. E. 68. Bituminous Surface Treatments; Bituminous Macadam, Bituminous Concrete, and Sheet Asphalt Pavements. Professor Blanchard.  
C. E. 84. Highway Transport Management. Professor Swinton.

### FEBRUARY 2 TO 13, 1925

C. E. 69. Highway Laboratory Research. Professor Morrison.

C. E. 70. Highway Structures. Professors Gram and Cissel.  
M. E. 40. Mechanism, Operation and Maintenance of Motor Trucks, Tractors and Trailers. Professor Lay.

### FEBRUARY 16 TO 19, 1925

Eleventh Annual State Conference on Highway Engineering at the University of Michigan.

C. E. 71. Highway Specifications, Contracts and Jurisprudence. Professor Riggs.  
C. E. 82. Highway Transport Costs and Record Systems. Professor Swinton.

### MARCH 9 TO 20, 1925

C. E. 76. Highway Engineering Theory and Design. Professor Swinton.  
C. E. 78. Grading Machinery and Operations, Drainage Systems, and Earth and Sand-Clay Roads. Professor Morrison.  
C. E. 79. Highway Transport Legislation. Professor Blanchard.  
C. E. 85. Traffic Engineering and Its Applications to Street Design and City Planning. Professor Blanchard.

### DECEMBER 8, 1924, TO MARCH 20, 1925

C. E. 75. Highway Engineering Seminar. Professors Blanchard, Morrison and Swinton.  
C. E. 83. Highway Transport Seminar. Professors Blanchard and Swinton.

## STUDENTS LEARN PROPER USE OF EXPLOSIVES

California Institute of Technology Gives Valuable Instruction

**E**XPLOSIVES are used so much in construction work that everyone engaged in construction should know how to handle them.

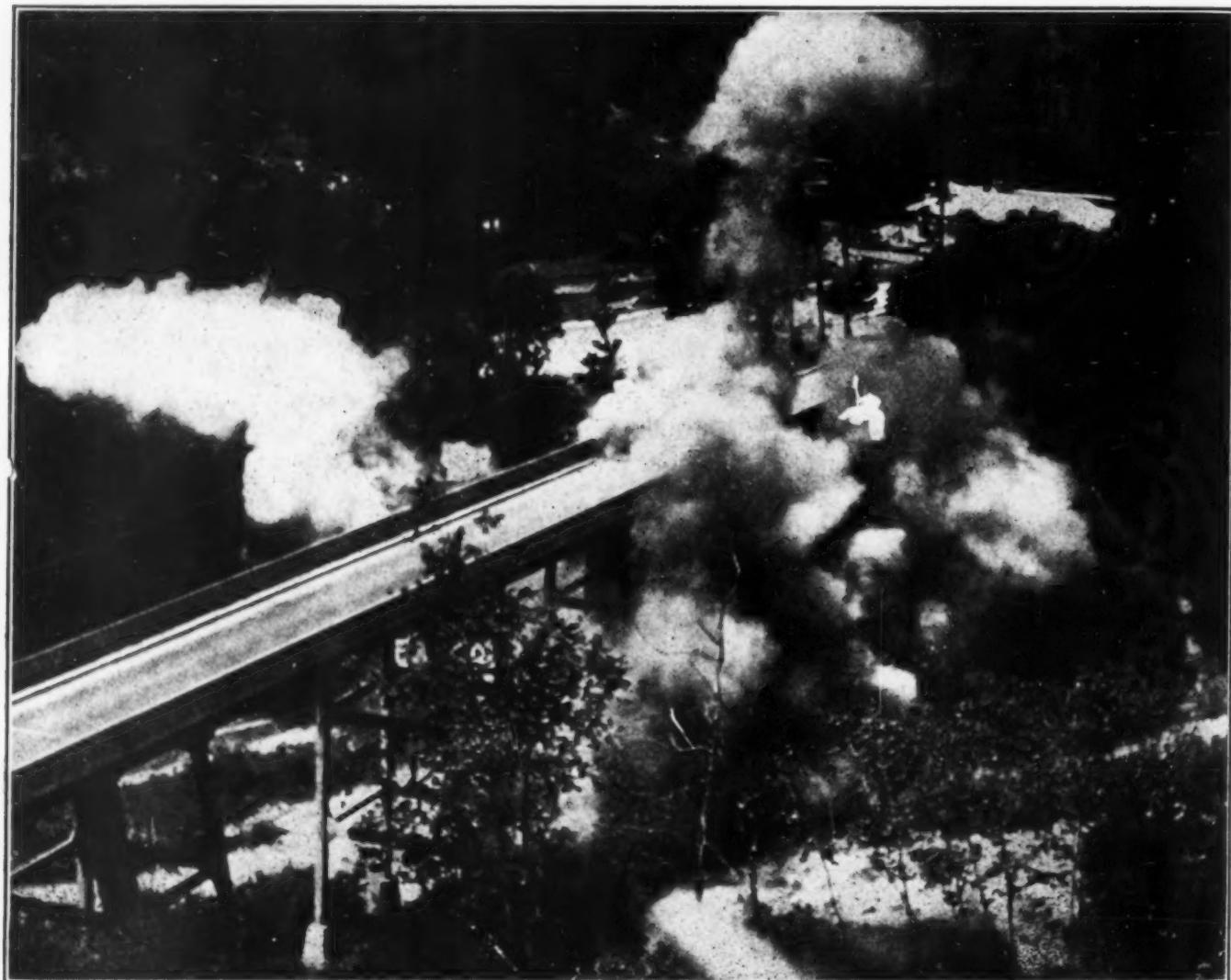
The California Institute of Technology at Pasadena is doing an important work by instructing its students how to handle explosives safely and carefully. When it became necessary to demolish a bridge that had outlived its usefulness, the job was handed over to the Institute, and the students, under the direction of competent instructors and experts in the use of explosives, took charge of the work of blowing up the



PHOTOGRAPHING THE EXPLOSION © P. & A. Photos

bridge. They took care of the entire job, placing the explosives where they would do the work most economically, seeing that everyone was kept out of the zone of danger when the explosion took place, taking photographs and making other observations which would be of value to future students at the Institute.

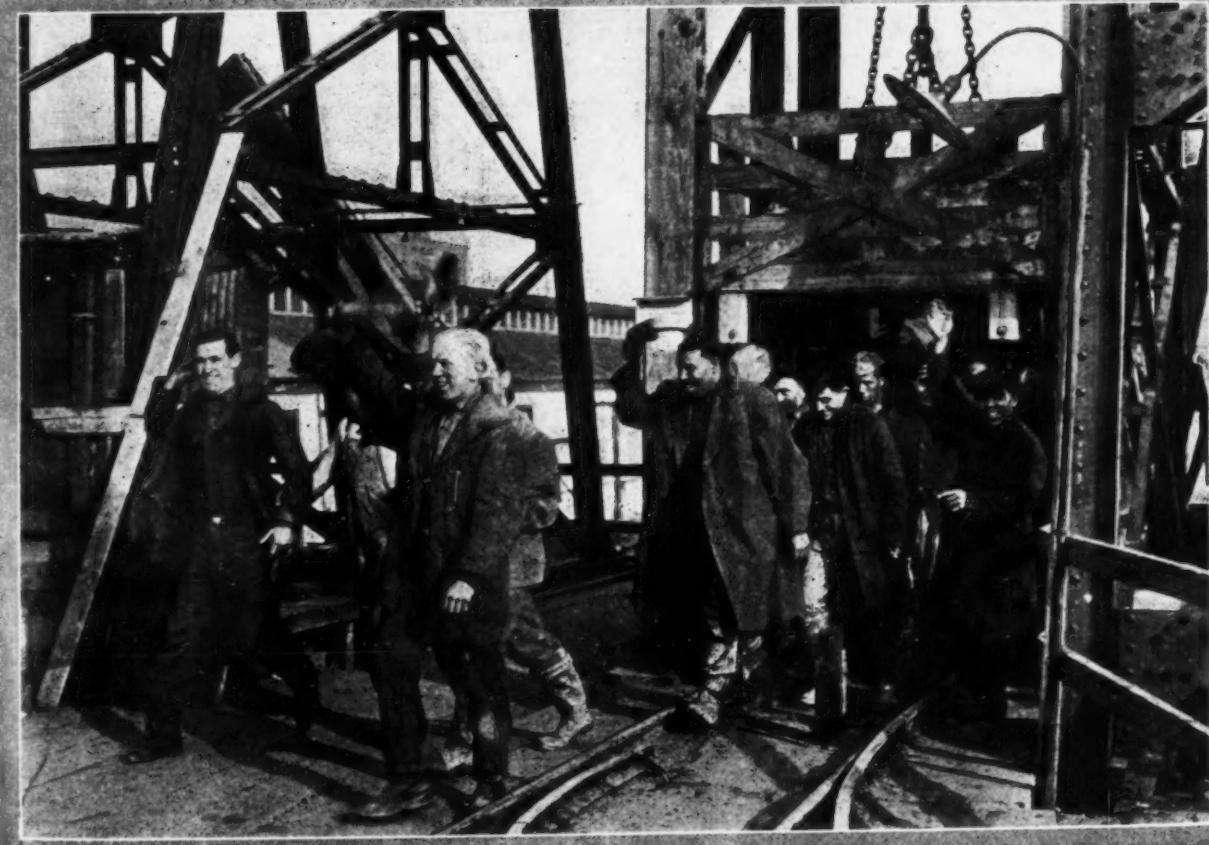
The lower photograph on this page shows the bridge at the moment the charge was set off. The upper photograph shows one of the students photographing an explosion. Needless to say, the students got a little extra thrill out of this bit of field work.



BLOWING UP BRIDGES IS PART OF COLLEGE COURSE

© P. & A. Photos

## Then and Now—A Study in Expressions



The little group of serious thinkers shown in the upper photograph are the notables who officially opened the first New York subway twenty years ago. The man with the fur collar is former Mayor McClellan, who was in office at that time. The men in the lower photograph are the sand hogs who fired the last blast connecting the ends of the New York and New Jersey vehicular tunnel under the Hudson River. The cares of life seem to rest much more lightly on them than on the worthies above. *Upper photograph © International* *Lower photograph © P & A Photos*

## FOUNDATION WORK IN BUFFALO

### Wind Stresses Make It Necessary to Take Extra Precautions

THE great height and narrow width of the new Liberty Bank Building, now under construction in Buffalo, will produce in that structure wind stresses so much out of the ordinary that extraordi-

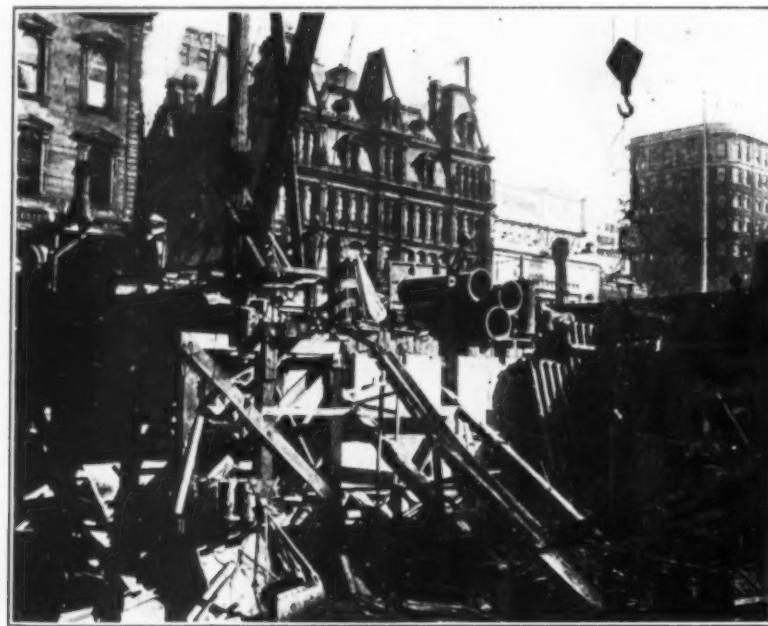
another, as fast as one is sunk the next one being placed over it.

Preliminary borings and experience with the first two or three caissons showed that 46 ft. below the surface a stratum of water and loose sand, 26 ft. in depth, was encountered. This offered some difficulty, as pumping out all the caissons would be an endless task. Compressed air, therefore, was used, and as soon as the water level is reached an air lock is placed upon the descending caisson, and air under high pressure is forced into it to keep the water back until the caisson has reached its destination.

When the caissons reach the bed rock, which at this point offers an admirable foundation, smooth and free from ledges, they are filled with concrete, also under pressure, making solid, permanent columns.

Considerable trouble was encountered with the party wall with the old Boyd Building, next door to the south. It was discovered that the wall projected so far over the line that if it were shaved to the line only 4 in. of it would be left.

A steel framework, consisting of 18-in. beams and girders, was accordingly erected to support the north side of the Boyd Building and the party wall removed. The building is being largely reconstructed, the most important portion of the work being that of the foundations. Steel tubing will



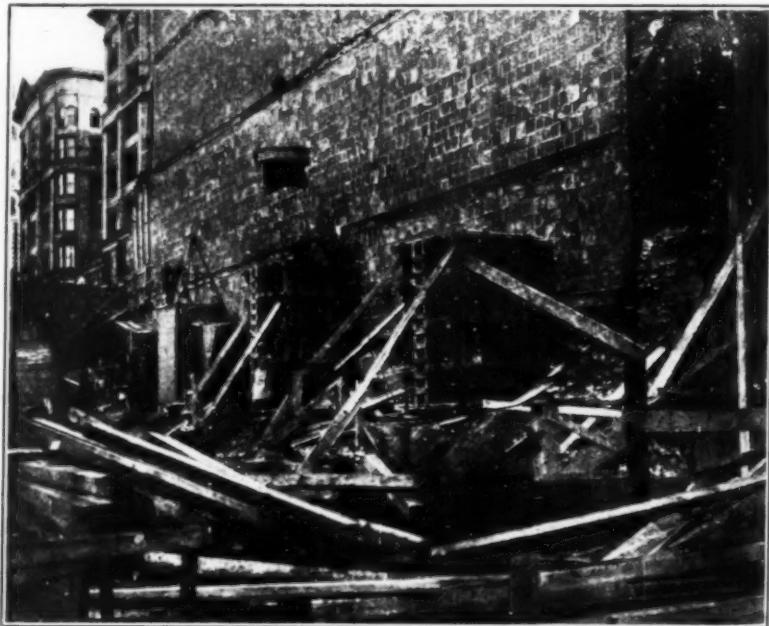
FOUNDATION WORK IN PROGRESS

nary methods have been devised to combat them. Buffalo ranks with Chicago as a city of high winds, and the Liberty Building, complete, will be more than 300 ft. high, twenty-three stories, by only 61 ft. in breadth, offering a wide, thin, sail-like surface to the wind.

The architect, Alfred C. Bossom of New York, planned to compensate for the severe stresses by great rigidity of construction and by carrying the foundations below the usual level. When his plans were submitted, however, it was found that even with the large factor of safety he had allowed, a still greater margin was advisable, and the plan was altered, 48 tons more steel being put into the building to take care of the wind stresses.

Work on the building began on July 7, and it is expected that the contractors, J. Gill & Sons, will turn the building over to the owners on Sept. 1, 1925. The chief feature of originality in the construction of the building, which is now practically ready for the steel work to begin, is in the depth and placing of the foundations and their extraordinary stoutness.

These consist of 37 pre-cast concrete caissons, which are being sunk 72 ft. to bed rock. The caissons are hollow and made in 12 ft. sections, the bottom section being tipped with steel. The six sections to each caisson are driven in, one on top of



STRENGTHENING OLD PARTY WALLS

be driven under the footings of the new Boyd Building wall to bed rock, making this building absolutely safe. The reconstruction of the old party wall will then be completed.

## SOUTHERN PACIFIC PUSHES CONSTRUCTION

### Improvement of Existing Lines and Building of New Track Included in Big Program

A COMPREHENSIVE program for construction work, new facilities and improvements necessary to give highest class transportation service to Pacific Coast States, has been launched by the Southern Pacific Railroad Company. Expenditures totaling in excess of \$50,000,000 are involved in the improvement program, which is being carried into effect as rapidly as possible.

Included in the improvements are the building of new lines, extensive double tracking, new classification and industrial terminals, creosoting plants, rock crushing plants, station buildings, additions to shop equipment, replacement and strengthening of bridges, line changes to eliminate curves, new and heavier ballasting and heavier rails, new tunnels and improvements to existing ones, and so on.

Outstanding in this work are such projects as the building of the Natron Cut-off and a new entrance to Portland, double tracking sections between San Francisco and Ogden and over the Tehachapi Mountains, from Tehachapi to Seivert, which will give complete double track from Bakersfield to Mojave, new station

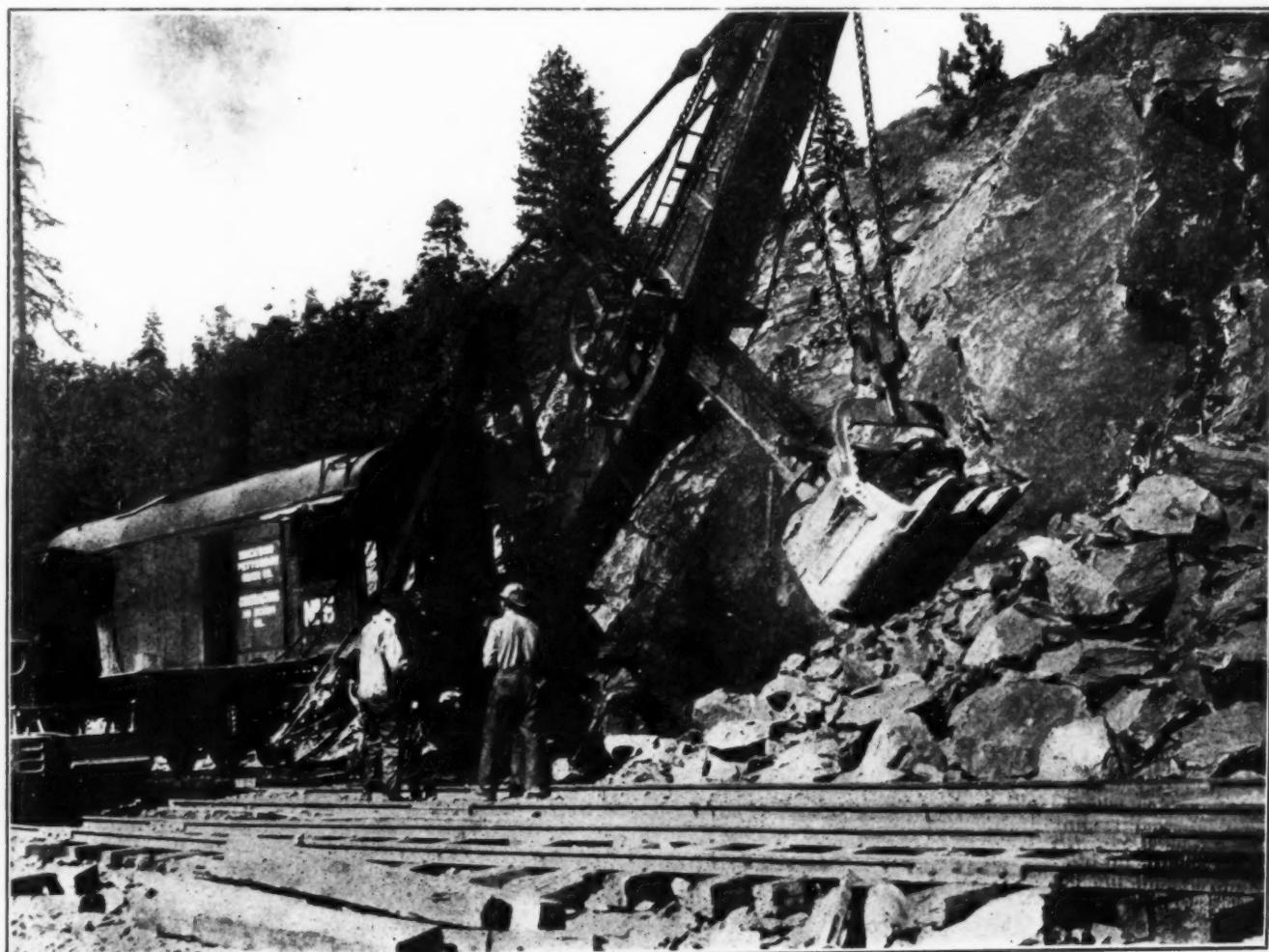
facilities at Sacramento, extensive new terminal in Los Angeles, and large tie and timber treating plant at Oakland.

Construction work on the Southern Pacific's new rail line from Kirk to Oakridge, Oregon, through Kane and Klamath counties, has been started and is being vigorously prosecuted. Construction of the line from Weed was begun in 1909 and the line built as far north as Kirk, Oregon, but, owing to the Central Pacific litigation affecting the title to the property, work was suspended. Then the war came, with its attendant cessation of practically all railway work.

The building of the line presents many engineering problems, as much of it traverses a mountainous region. George W. Boschke, chief engineer for the Southern Pacific, has jurisdiction over construction of the new line, and H. P. Koey, assistant engineer, is in charge of work on the ground.

The grading of the first 30½ miles of the new line is just about finished.

The first work was the construction of a bridge across a stream which flows immediately in front of



EXCAVATING IN EMIGRANT GAP IN PREPARATION FOR LAYING SECOND TRACK THROUGH SIERRAS

the pile driver shown in the photograph on page 21, which shows the end of the old line at Kirk. From Kirk the line will run for approximately 22 miles in a northerly direction through the Klamath Indian Reservation; then north and northwest for 35 miles to the summit of the Cascade Mountains, where an elevation of 4817 ft. above sea level is reached at Odell Pass. After crossing the Cascade Range the line descends through a picturesque and heavily wooded mountainous region to the present terminus of the company's line at Oakridge, 43 miles from Eugene, Ore. The project entails about 118 miles of construction work through a scenic and practically virgin section of Oregon and will cost in the neighborhood of \$15,000,000. Completion of the new line is expected some time during 1926.

The Southern Pacific Railroad Company is double tracking parts of its line and building more passing

tracks at strategic points from San Francisco to Ogden. This work, together with a double track arrangement now being negotiated with the Western Pacific, will greatly facilitate the tremendous movement of Pacific Coast crops to the East. A part of this second track construction work over the mountains and in Nevada, entailing an expenditure of nearly \$3,000,000, has been almost completed.

Arrangements being completed for carrying on this important work over the original Central Pacific line will necessitate additional expenditure in excess of \$8,000,000 and will result in a continuous stretch of double track of 166 miles from San Francisco to Emigrant Gap, a continuous stretch of double track from Andover to

Sparks, a distance of 46 miles. This second track construction work is being carried on without interfering with the operation of the regular traffic on the first track.



PILE DRIVER AT BEGINNING OF NEW LINE

## ROAD SHOW MORE POPULAR THAN EVER

Demand for Space So Great That Floor Plans Have to Be Revised—Good Program for A. R. B. A. Convention

IT looks as though the greatest problem facing the American Road Builders' Association is the discovery of a place big enough to hold its annual Road Show. When the applications for space in the Show, to be held Jan. 5 to 9 next in the Chicago Coliseum and adjoining buildings, were opened it was found that the space available for heavy machinery was 200 per cent oversubscribed and the space in which high machinery could be installed was 400 per cent oversubscribed. It is hardly necessary to say that this made the allotment of space an extremely difficult matter and a new arrangement of aisles had to be worked out before even an approximately satisfactory solution was found.

It was, of course, necessary to make a uniform cut in the space applied for, but the exhibitors, realizing the situation, are cooperating with the committee in charge by curtailing their exhibits and at the same time presenting the machines and products which they know

will be of the most interest to the throngs of contractors who will attend the Show.

The A. R. B. A. convention, which will be held simultaneously with the Road Show, will again be at the Congress Hotel. The program, which has been prepared by Prof. T. R. Agg, contains a long list of subjects which are of vital interest to everyone engaged in road construction. The contractor, the engineer, the public official and all others active in the highway industry will find the papers and discussions of great interest. The detailed program will be announced shortly.

Arrangements have been made this year to handle hotel reservations in such a manner that every one will be properly cared for. A special hotel committee has prepared a booklet giving a list of Chicago hotels with their rates and containing a reservation blank. This booklet will be sent to anyone who wishes it.

The Entertainment Committee is planning to take good care of the time not already allotted to the sessions of the Convention and the Road Show. The delegates and guests of the Association will find plenty to do every minute while they are in Chicago. The Annual Banquet of the A. R. B. A. will be held at the Congress Hotel on Wednesday evening, Jan. 7. A dance at the Club Chez Pierre and the usual exhibitors' night in the First Regiment Armory, near the Coliseum, also are on the entertainment program.

Those who attend the Convention and Road Show will be able to keep in touch with what is going on

through The Highwayman, the official A. R. B. A. paper, which will be issued daily, as in the last two years. The official announcements, the program of the day and various other matters of interest will be published in The Highwayman.

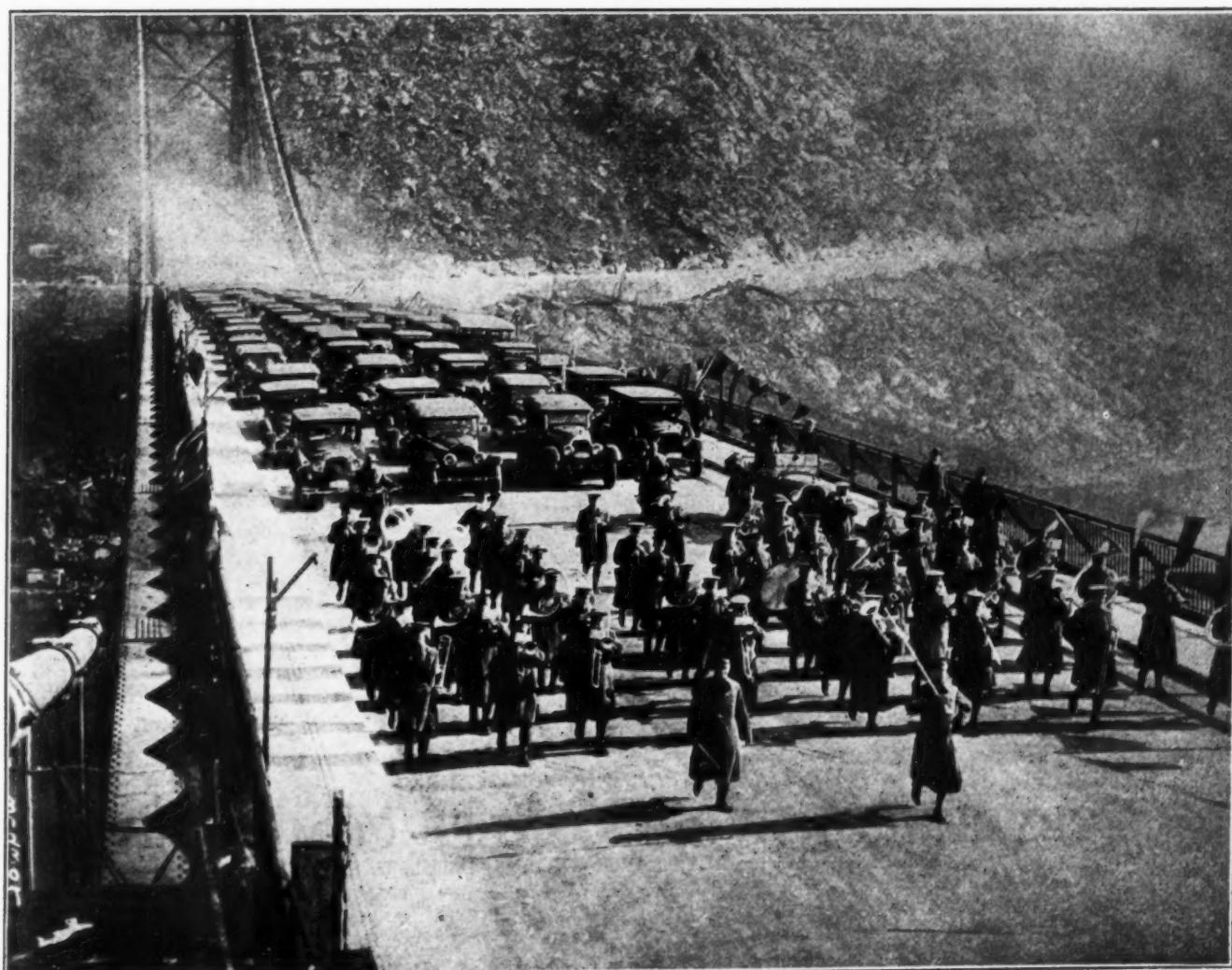
C. M. Upham, Business Director of the Association, will open headquarters at the Congress Hotel on Dec. 1. These headquarters will be maintained until the end of the Convention and Road Show and all who desire information in regard to either Convention or Show should write to the American Road Builders' Association, Congress Hotel, Chicago.

## TRUMPETS BLARE AT BEAR MOUNTAIN

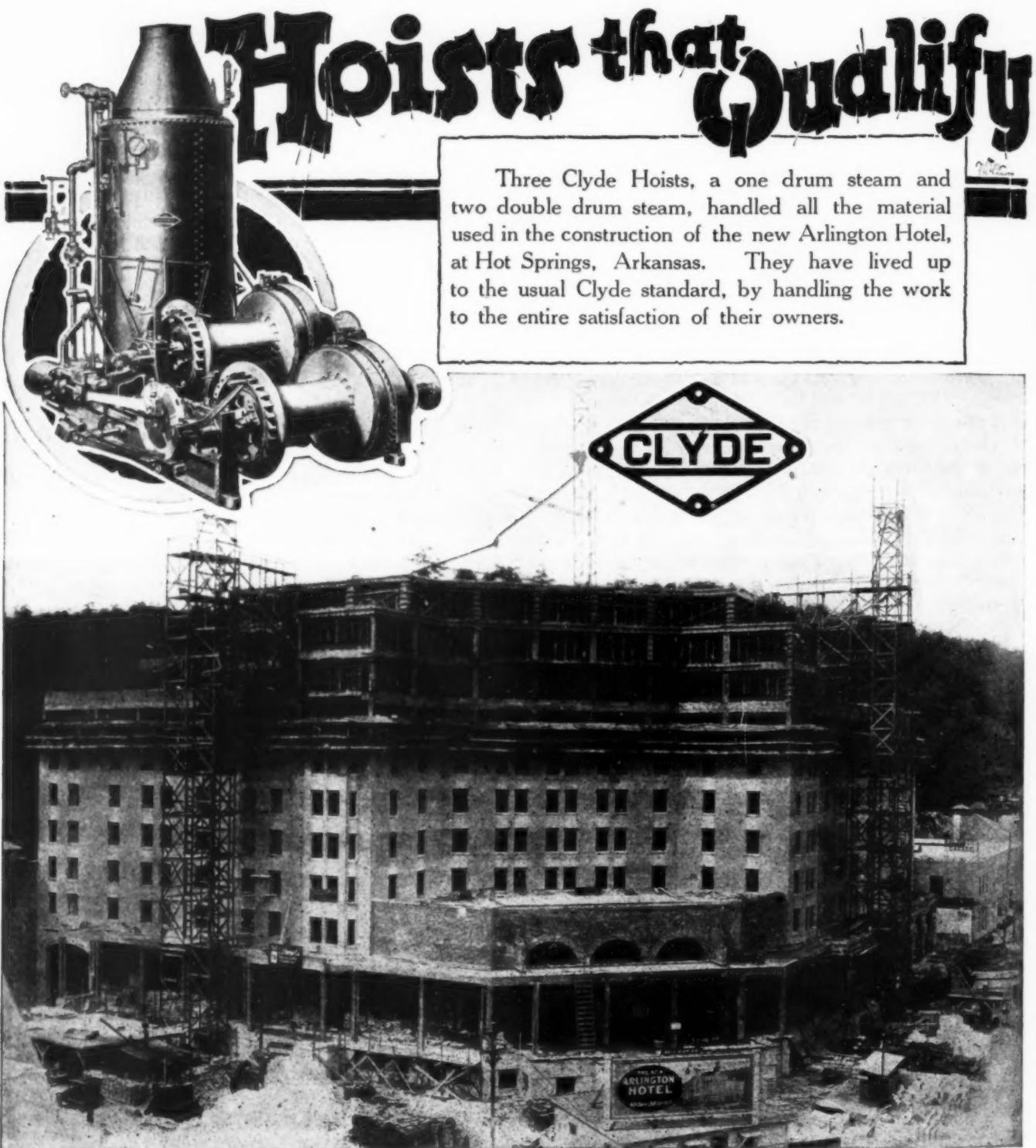
**I**N the October issue of *SUCCESSFUL METHODS* an article describing the construction of the approach to the Bear Mountain Bridge across the Hudson River said that the bridge would be open for traffic on Jan. 1, 1925. This proved to be an error, as the photograph below attests. The work of construction proceeded so much faster than was anticipated at the time the article was written only two months ago that it was found possible to open the bridge to public

traffic on Thanksgiving Day. The photograph was taken the day before, when the official opening was conducted with all due ceremony. The West Point band came down the river for the occasion and led the way across the new structure, followed by four lines of motor cars.

On the following day when the bridge was open to the public about 5000 cars passed over it, thereby contributing a tidy sum toward the cost of the bridge.



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Mr. G. H. Burden, of Ault & Burden, general contractors, writes: "We are glad to furnish photo of the Arlington Hotel with our best wishes and take this occasion to express our complete satisfaction with the three Clyde Hoists used on this operation.

"This equipment has not given us at any time the least trouble and has met every demand made upon it. We wish to assure you of our high regard for the equipment secured from your good company and the genuine quality involved."

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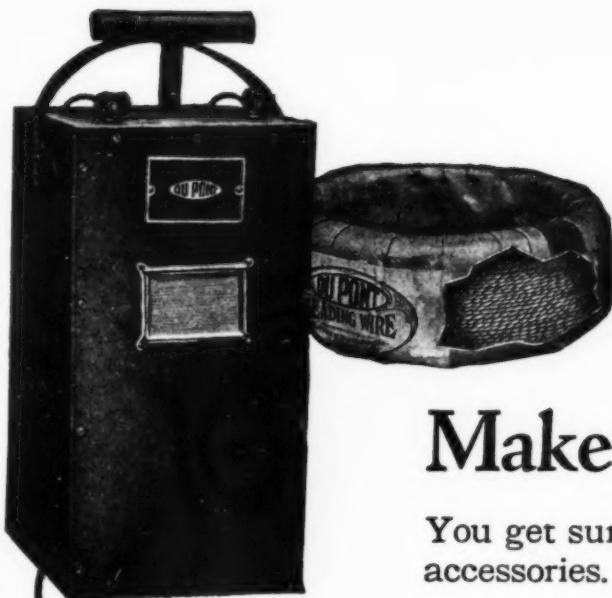
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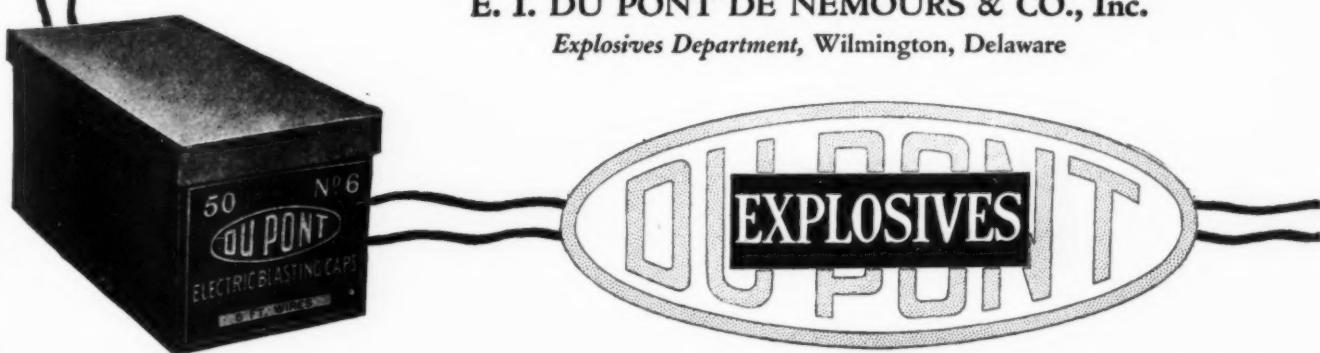
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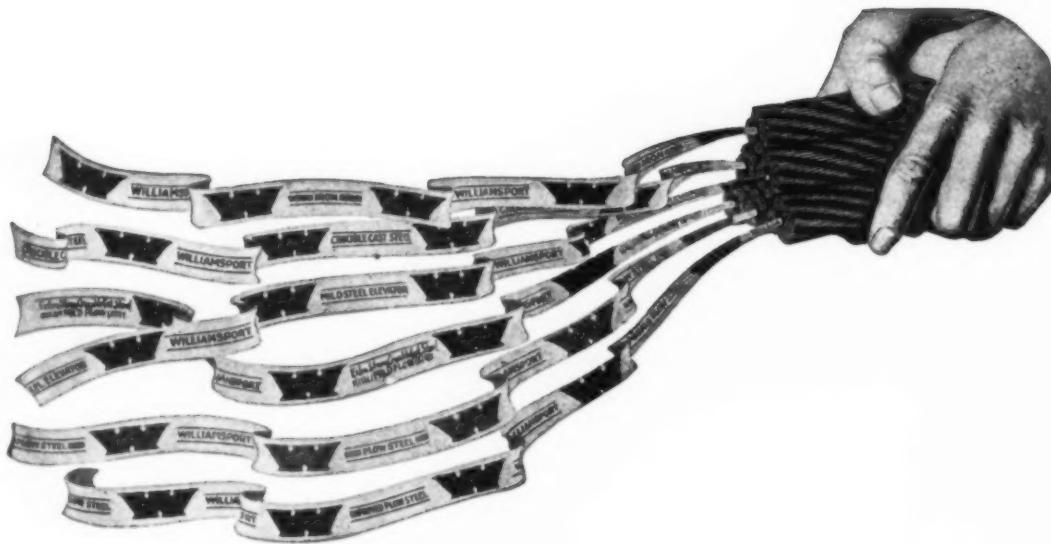
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It is the only Wire Rope made that carries positive evidence of its grade from the moment it becomes a rope, a protection of vital and far reaching importance that every user recognizes.

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Loading Cinders under the boilers at Hauto, Pa.  
Western 30-yard Air Dump Cars.

WESTERN Air Dump Cars solve the vexatious problem of cinder and waste disposal at Industrial Plants. Can be loaded as desired and taken when convenient to low ground to be filled and dumped instantly by air. One round trip a day, taking only a few minutes time.

Many plants handle their waste in Western Dump Cars. May we refer you to them? Let's figure it out and see if we can suggest an economical installation at your plant.

*We make a 45-yard Air Dump Car expressly for handling waste and other bulky material.*

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Ingersoll-Rand Portable Air Compressors\* and "Jackhamer" Drills are the standard rock drilling outfits of hundreds of contractors. The constant, reliable and economical service given by these compressors and tools is the reason for their popularity. They have made possible the completion of many contracts in greatly reduced time and insured extra profits.

To operate the rock drills there are six sizes of Ingersoll-Rand Portable Compressors available with a variety of mountings to suit the contractors needs. Five sizes of "Jackhamer" Drills enable the selection of the right drill for the work and make it possible to purchase a complete rock drilling unit from one manufacturer.

There are many other labor aiding I-R compressed air tools. Let us send you our booklet "One Hundred and One Ways to Save Money."

Two "Jackhamer" Rock Drills operated by the above portable compressor. This 7x6 Compressor will operate two "BCR-430 Jackhamer" Rock Drills; or one "DCR-23 Jackhamer" Rock Drill; or four CC-25 Paving Breakers; or five Clay Diggers; or five No. 22SR Backfill Tamers; or six No. 28 Chipping and Caulking Hammers; or five No. 8-A Riveters.

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## Road Work Under Difficulties

Cutting the new Cairo-Harrisville road through the hills of West Virginia was a tough job. It called for the most capable road engineering as well as dependable equipment.

G. T. Fogle & Company, road contractors of Charleston, were awarded the contract. They selected a Type O Theew Steam Shovel for the job. Their good judgment is proved by results.

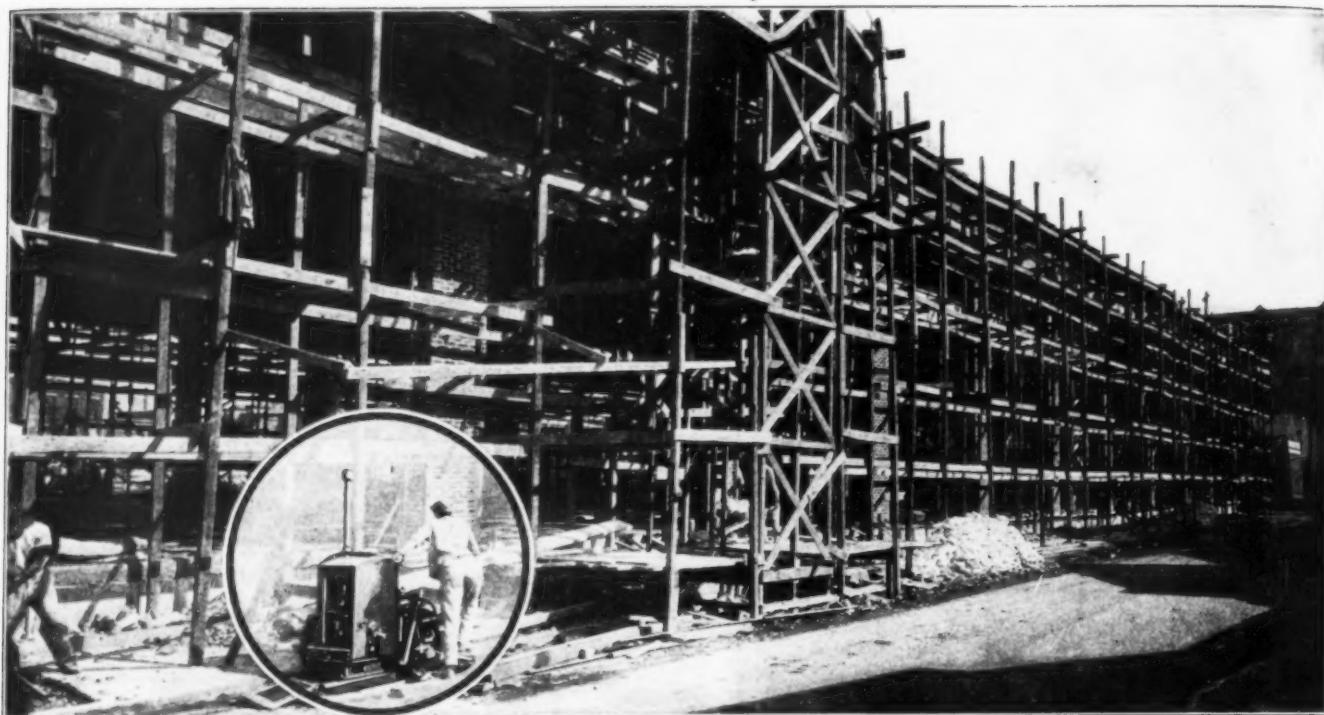
Much of the cutting was through virgin

territory, up and down steep slopes, through rocky ledges and tangles of vegetation. After handling about 115,000 cubic yards of material, over fifty per cent of it rock, Mr. Fogle says that his Theew is still as good as new. Reports like this are being constantly received from Theew users.

Let your next shovel be a Theew and you too will find it one of the best investments you ever made.

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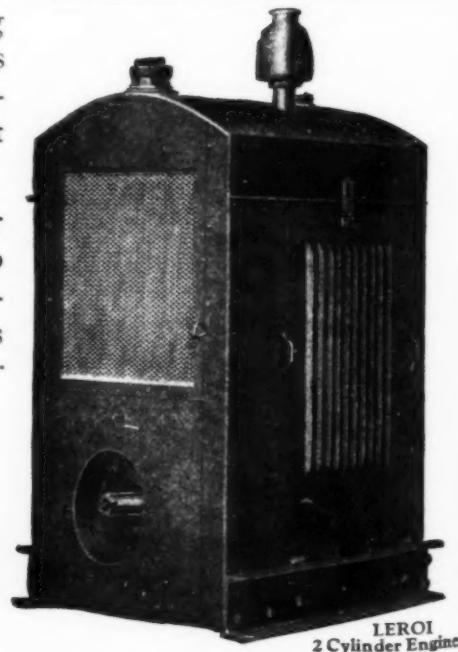
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### LEROI Power Service

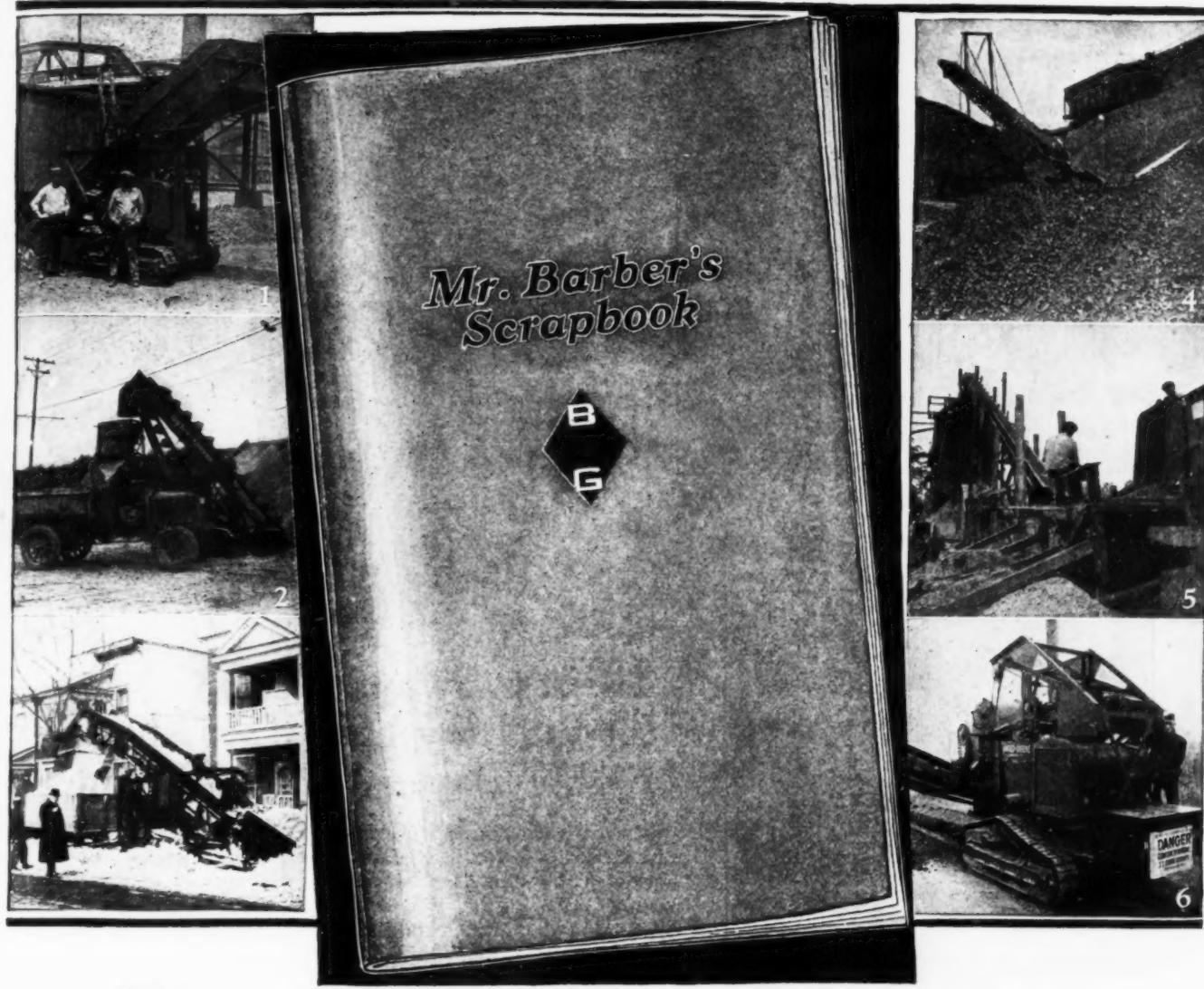
HOPPER COOLED TYPE—3 to 4 H. P.  
Single Cylinder—5 to 8 H. P. Two Cylinder.

RADIATOR COOLED TYPE—6 to 8 H. P.  
Two Cylinder—10 to 15 H. P. Four Cylinder.



LEROI COMPANY, Milwaukee, U. S. A.

**LEROI ENGINES**  
*for dependable power!*



## For one cent you can inspect thirty-five material-handling jobs

You have often wanted to examine the material-handling layouts that have proved conspicuously successful in plants similar to your own. Yet the cost of a satisfactory tour of inspection is prohibitive, both in time and money. For one cent you can have this information, in brief and lucid form, ready for instant reference, by sending a postcard for "Mr. Barber's Scrap Book."

As designer of Barber-Greene equipment, Mr. Barber has maintained a rigid check on the way in which Barber-Greene are meeting material-handling requirements of every sort.

He has acquired such a mass of valuable data which bears directly upon your own operations, that we have collected

some of it and bound it in a compact forty-page booklet. The photographs show graphically how a great many companies are defeating the heavy overhead costs of unskilled labor, and at the same time often increasing production speed as much as 300%.

With immigration restriction choking the supply of unskilled labor at its source, the high cost of moving materials by hand threatens to mount even higher. This presents you with a serious problem, which cannot be ignored without loss. It is just here that "Mr. Barber's Scrap Book" should prove valuable. It will point the way to greater economy, efficiency and speed, no matter what the nature of your work. Send for it.

**BARBER-GREENE COMPANY—Representatives in 50 cities** —530 W. Park Ave., Aurora, Illinois

**BARBER**  
Portable Belt Conveyors  
Coal Loaders . . . Automatic



**GREENE**  
Self Feeding Bucket Loaders  
Ditch Diggers . . . Coal Feeders



Universal Crane owned by Coffman's Crane Service removing snow for the City of Detroit.



Chicago Crane Service machine loading snow in Chicago.



J.C. Coleman Universal Crane loading snow in Boston

## There's Always Work for the Busy UNIVERSALS Night—Day—Winter—Summer

Detroit snowbound! Coffman's Crane Service rushes its motor-truck-mounted Universal to the rescue. Loads snow into 5-ton dump trucks at a speed of 27 loads an hour. Works day and night. Saves the city \$1.25 on every load. Makes money for Coffman.

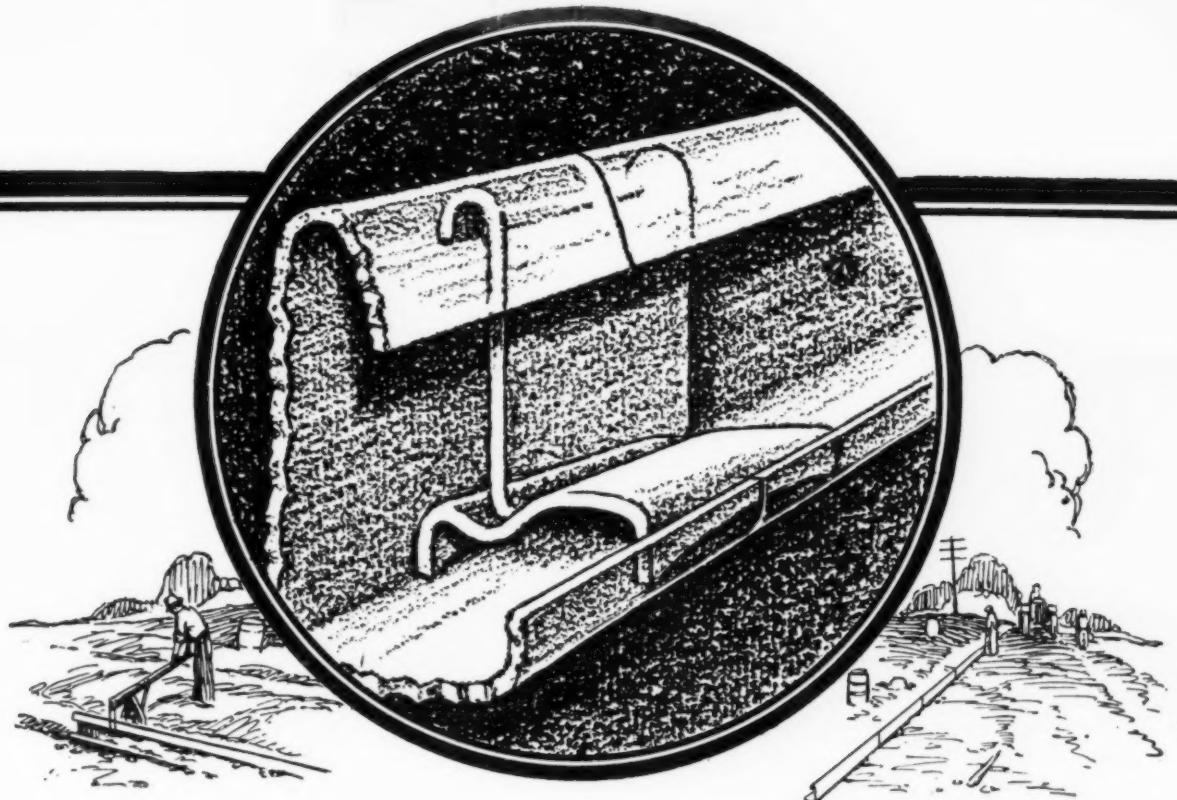
Chicago buried! Chicago Crane Service awake to its opportunity. Bang! Bang! There go their Universals to dig Chicago out. Keep three shifts busy 24 hours a day for 8 days. Save big money for the Windy City. Make good money for the Universal owner.

A tale of two cities only, but Universals in Boston and other cities did the same. The point we wish to make is that there is always work for the Universal to do, the year round. It is universal in scope as to jobs—universal in operation as to seasons. That's why it's a paying investment. It is a proven fact that Universals can be made to earn more money in winter than in summer.

*Write for Bulletin No. 201N*

**The UNIVERSAL CRANE CO.**  
903 Swetland Bldg., Cleveland, O.





## Why Carr Forms Don't Sag at the Joints

Investigation has shown conclusively that weak and loose form joints cause nearly half of the surface irregularities in pavements. You can overcome this source of trouble by using Carr Forms. The wedge lock of the Carr Form holds the sections securely together. Joints *can't* sag.

Also, because the joints are tight, each section is given additional support by adjacent sections.

### Other features:

**The 12 foot length section**—20% more form placed with every section handled.

**The Round Top**—self-cleaning, no concrete can lodge **on** it.

**Flat stakes**—driven anywhere along the 6 inch base.

**Simplicity**—no fabricated parts or rivets to come loose.

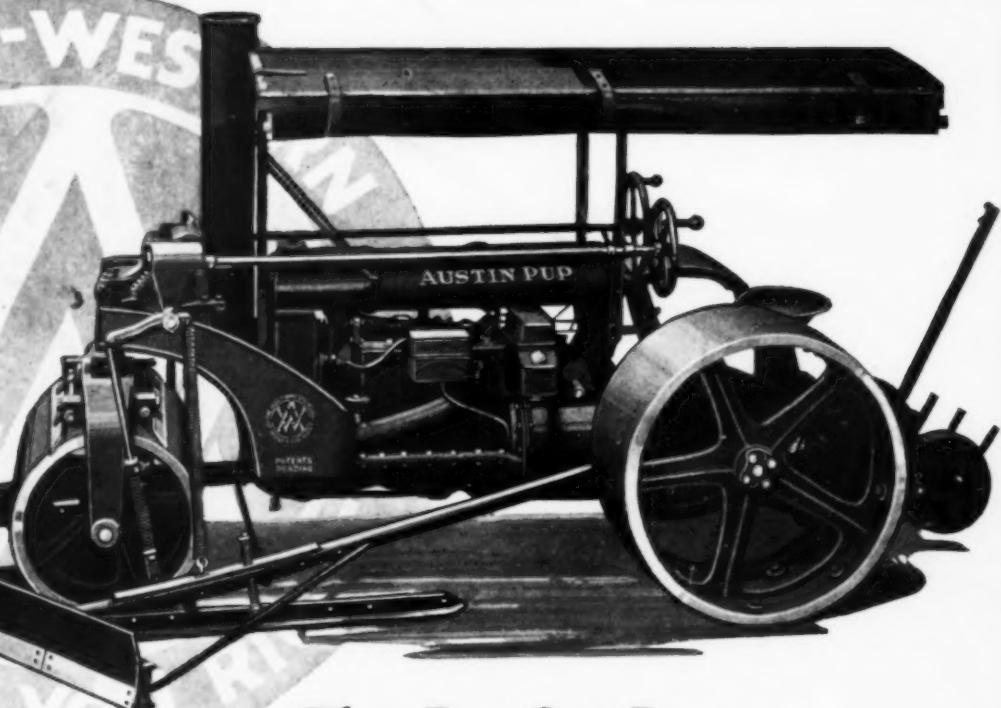
*Write for Bulletin 45-S*

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**THE LAKEWOOD ENGINEERING COMPANY**  
CLEVELAND, OHIO



## They Buy One Pup and then Come Back for More

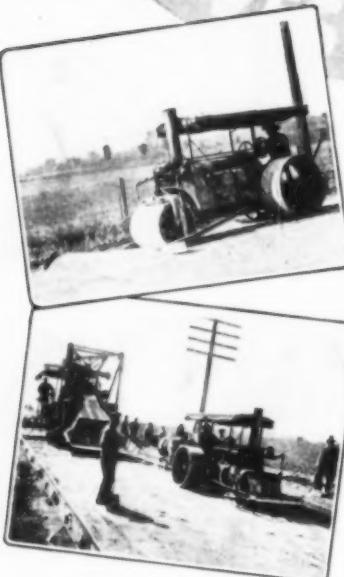
UNTIL the Austin Pup was exhibited at the 1923 Good Roads Show, no one supposed that a single, one-man machine, costing little to buy and next to nothing to run, could combine the features of a road maintainer, roller and scarifier, and replace elaborate outfit costing several times as much both to buy and operate. In a word, the Pup seemed almost too good to be true, so while some officials and contractors were quick to realize its possibilities, they generally ordered but a single machine at first to make sure it was really as good as it looked.

They bought one Pup and then came back for more, and there is no better evidence of satisfactory performance than repeat orders. Space will not permit anything like a complete list of all the fleets of Pups that are now engaged in saving time, labor and money for their owners, but here is a list of 100 "Repeats" that is typical of all the rest.

### Florida State Highway Department 5      New York State Highway Department 8

Georgia	"	2	N. Carolina	"	10
Indiana	"	2	Ohio	"	2
Michigan	"	11	Virginia	"	6
Missouri	"	2			
University of Iowa	2	Joseph Kesi & Sons	Ill.	2	J. C. Devine Co.      Ohio 2
Berrien County	Mich. 3	The Madison Const. Co.	"	2	Connell Laub & Bracht Const. Co.      2
Town of Northcastle	N.Y. 4	Verhey Construction Co.	"	2	Green Construction Co. Okla. 2
Oswego County	"	George T. Miller	Ind.	2	David Schoentag, Inc. Penn. 2
Caddo County	Okl. 2	Harrison Const. Co.	Iowa 2	2	W. L. Pearson & Co. Tex. 3
Hamilton County	Tenn. 3	Ritchie & Ramsey	Kans. 2	2	Smith Brothers Inc.      3
Bryson Paving Co.	Fla. 2	Louis Des Cognets Co.	Ky. 2	2	Uvalde Rock Asphalt Co.      2
Cecil R. Scott	"	Devendorf Corporation	N.Y. 4	2	Hoffman Construction Co.      2
Milburn Bros.	Ill. 2	McDonald Const. Co.	"	2	

Pup imitators are making desperate efforts to construct a machine that will do the work of the Pup, by attaching a blade to a roller, without the long runners or the depth gauges or the springs that are covered by our patents. One concern has made as many as three different types, all of them failures. These elements of runners, depth gauges and springs are an essential feature of this machine, and no machine can be made to do its work without them. The value of the Pup lies, to a great extent, in its blade equipment, as nothing can equal it in maintaining, grading and leveling at minimum expense. The work of the blade is made possible by the long runners that hold it to a level course through hills and hollows, while blades without these runners ride over the hills and deepen the hollows. This explains why nearly all Pups are sold with full blade equipment and why some competitors are trying to sell rollers alone, concerning which there is nothing new, because of being unable to attach any blade equipment without infringing our patents. The blade is the most important part of this machine, and even though you don't need it now, you probably will on the next job, so don't buy a Pup without its blade.



*The coupon will bring  
you the whole story of  
the Austin Pup. You'll  
find it interesting.*



I'd like to know more about the Austin Pup.

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**THE AUSTIN-WESTERN  
ROAD MACHINERY CO.  
CHICAGO**

